

**THE FIFTH YUGOSLAV MATERIALS
RESEARCH SOCIETY CONFERENCE**

YUCOMAT 2003

**Programme
and
The Book of Abstracts**

**HERCEG NOVI,
September 15-19, 2003**

Organized by:

YUGOSLAV MATERIALS RESEARCH SOCIETY

and

INSTITUTE OF TECHNICAL SCIENCES OF THE SASA

<http://www.yu-mrs.org.yu>

YU

-

CO

MAT

**THE FIFTH YUGOSLAV MATERIALS
RESEARCH SOCIETY CONFERENCE**

YUCOMAT 2003

**Programme
and
The Book of Abstracts**

**HERCEG NOVI,
September 15-19, 2003**

Organized by:

YUGOSLAV MATERIALS RESEARCH SOCIETY
and
INSTITUTE OF TECHNICAL SCIENCES OF SASA

<http://www.yu-mrs.org.yu>

YU

-

CO

MAT

Title: THE FIFTH YUGOSLAV MATERIALS RESEARCH SOCIETY CONFERENCE
“YUCOMAT 2003”
Programme
and
The Book of Abstracts

Publisher: Institute of Technical Sciences of SASA
Knez Mihailova 35/IV; P.O. Box 315, 11000 Belgrade
Phone: +381 11 185-437; Fax: + 381 11 185-263

Editor: Prof. Dr. Dragan P. Uskoković

Technical editor: Aleksandra Stojičić

Cover page: Aleksandra Stojičić

Copyright © 2003 Institute of Technical Sciences of the Serbian Academy of Sciences & Arts

Acknowledgment: The editor of the book of abstracts is grateful to the Ministry of Sciences, Technologies and Development of Republic of Serbia for its financial support of this book and The Fifth Yugoslav Materials Research Society Conference “YUCOMAT 2003” held in Herceg Novi.

Printed in: Printing office “Čigoja”
Studentski trg 15, 11000 Belgrade
Phones: + 381 11 186-725; + 381 11 625-954
Circulation: 250 copies. The end of printing: July 2003.

Organized
by
Yugoslav Materials Research Society
and
Institute of Technical Sciences of SASA, Belgrade

Materials science and engineering incorporate acquiring of knowledge on synthesis and processing of materials, their composition and structure, properties and behaviour, functions and potentialities as well as application of that knowledge to various final products. Economic prosperity, life quality, and healthy environment are tightly connected with the improvements in the existing and the development of new materials and processing technologies. These improvements are development can contribute greatly to the national priorities: energy saving, environment and health protection, information and communication, infrastructure, transportation, etc.

The Yugoslav Materials Research Society (YU-MRS), a non-government and non-profit scientific association, was founded in 1997 to promote multidisciplinary goal-oriented research in materials science and engineering. Main task and objective of the Society is to encourage creativity in materials research and engineering to reach a harmonic coordination between achievements in this field in our country and analogous activities in the world with an aim to include our country into the global international projects.

Yu-MRS OFFICERS:***President:***

- Dragan Uskoković

Vice-presidents:

- Slobodan Milonjić
- Velimir Radmilović
- Branislav Radonjić
- Dejan Raković

General Secretary:

- Jovan Nedeljković

Members:

- Snežana Bošković
- Milorad Davidović
- Vera Dondur
- Slobodan Jovanović
- Djuro Koruga
- Zoran Petrović
- Milenko Plavšić
- Zoran Popović
- Momčilo Stevanović
- Jovan Šetrajčić
- A. Terlecki-Baričević
- Mira Vukčević
- Miodrag Zlatanović

**ORGANISING
COMMITTEE:*****Chairman:***

- Slobodan Milonjić

Members:

- Nikola Cyjetićanin
- Ljiljana Čerović
- Kemal Delijić
- Miroslav Dramićanin
- Nenad Ignjatović
- Djordje Janačković
- Jovan Mirković
- Nebojša Mitrović
- Nebojša Romčević
- Vladimir Srdić
- Edin Suljovrujić

Conference Secretary:

- Aleksandra Stojičić

CONTENTS

PROGRAM:

i-xxxix

ORAL PRESENTATION:

Symposium A:	ADVANCED METHODS IN SYNTHESIS AND PROCESSING OF MATERIALS	
Session I	(<i>PL.S.A.I.1.-3.-O.S.A.I.1.-6.</i>)	1
Session II	(<i>PL.S.A.II.1.-O.S.A.II.1.-10.</i>)	7
Symposium B:	ADVANCED MATERIALS FOR HIGH TECHNOLOGY APPLICATIONS	
Session I	(<i>PL.S.B.I.1.-3.-O.S.B.I.1.-9.</i>)	13
Session II	(<i>O.S.B.II.1.-13.</i>)	21
Session III	(<i>O.S.B.III.1.-6.</i>)	27
Symposium D:	COMPOSITES	
Session I	(<i>PL.S.D.I.1.-O.S.D.I.1.-6.</i>)	31
Symposium C:	NANOSTRUCTURED MATERIALS	
Session I	(<i>PL.S.C.I.1.-O.S.C.I.1.-12.</i>)	35
Session II	(<i>PL.S.C.II.1.-2.-O.S.C.II.1.-9.</i>)	43
Symposium E:	BIOMATERIALS	
Session I	(<i>O.S.E.I.1.-5.</i>)	49

POSTER PRESENTATION:

Session I (Symposium A)	(<i>P.S.A.1.-42.</i>)	53
Session II (Symposium B)	(<i>P.S.B.1.-44.</i>)	81
Session III (Symposiums C, D and E)	(<i>P.S.C.1.-11.</i>)	103
	(<i>P.S.D.1.-12.</i>)	110
	(<i>P.S.E.1.-20.</i>)	117

AUTHOR INDEX

129

Programme

CONFERENCE PROGRAMME

SYMPOSIUM A Advanced Methods in Synthesis and Processing of Materials

SYMPOSIUM B Advanced Materials for High-Technology Application

SYMPOSIUM C Nanostructured Materials

SYMPOSIUM D Composites

SYMPOSIUM E Biomaterials

GENERAL INFORMATION

DATE AND VENUE: The conference will be held on September 15-19, 2003, at the PLAŽA Hotel, in Herceg Novi, Serbia and Montenegro.

Participants will be accommodated at the Plaža Hotel.

The conference will begin on Monday, September 15, at 09.00 and end on Friday, September 19, 2003 at 12.00.

REGISTRATION: Registration, registration fee payment, conference materials distribution, etc, will take place at the conference desk (Conference Secretariat) open on Sunday, September 14, from 16.00 to 19.00 and on Monday, September 15, from 07.30 to 09.00.

At registration, the participants are requested to submit proof on their advance registration fee payment.

INSTRUCTION FOR AUTHORS: The conference will feature plenary session and poster session.

Oral presentations of papers to be given in PLENARY SESSIONS are limited. Time available for delivery is 30 min for invited and 15 min for other papers including discussion (5-10 min). A graphoscope and video-beam are available.

In POSTER SESSION, the authors are requested to display their papers two hours before the session and to be present at their posters during the session.

PUBLICATION OF PAPERS: Abstracts will be included in a book of abstracts and distributed to each participant at registration.

The Proceedings will be published, as those from the previous conferences, by Trans Tech Publications Ltd., Switzerland, in Mat. Sci. Forum Edition. The papers will be refereed and those selected will be included in the Proceedings Volume.

CONFERENCE AWARDS: The Yugoslav Materials Research Society (Awards Committee: Professors M. Davidović, M. Plavšić and V. Dondur) will award the authors (preferable young members under 35) of the best oral and poster presentation at the conference, and also the authors of highly rated PhD and MSc Theses defended between two conferences. The benefits include free registration, and living expenses at an appropriate rate during the conference.

EXCURSIONS: Excursions can be organised on Wednesday afternoon, Friday after the close of the Conference and on Saturday. Possible destinations are Dubrovnik, Sv. Stefan, Cetinje and Ostrog, per choice.

Organized
by
Yugoslav Materials Research Society
and
Institute of Technical Sciences of SASA, Belgrade

Materials science and engineering incorporate acquiring of knowledge on synthesis and processing of materials, their composition and structure, properties and behaviour, functions and potentialities as well as application of that knowledge to various final products. Economic prosperity, life quality, and healthy environment are tightly connected with the improvements in the existing and the development of new materials and processing technologies. These improvements are development can contribute greatly to the national priorities: energy saving, environment and health protection, information and communication, infrastructure, transportation, etc.

The Yugoslav Materials Research Society (YU-MRS), a non-government and non-profit scientific association, was founded in 1997 to promote multidisciplinary goal-oriented research in materials science and engineering. Main task and objective of the Society is to encourage creativity in materials research and engineering to reach a harmonic coordination between achievements in this field in our country and analogous activities in the world with an aim to include our country into the global international projects.

Yu-MRS OFFICERS:***President:***

- Dragan Uskoković

Vice-presidents:

- Slobodan Milonjić
- Velimir Radmilović
- Branislav Radonjić
- Dejan Raković

General Secretary:

- Jovan Nedeljković

Members:

- Snežana Bošković
- Milorad Davidović
- Vera Dondur
- Slobodan Jovanović
- Djuro Koruga
- Zoran Petrović
- Milenko Plavšić
- Zoran Popović
- Momčilo Stevanović
- Jovan Šetrajčić
- A. Terlecki-Baričević
- Mira Vukčević
- Miodrag Zlatanović

**ORGANISING
COMMITTEE:*****Chairman:***

- Slobodan Milonjić

Members:

- Nikola Cyjetićanin
- Ljiljana Čerović
- Kemal Delijić
- Miroslav Dramićanin
- Nenad Ignjatović
- Djordje Janačković
- Jovan Mirković
- Nebojša Mitrović
- Nebojša Romčević
- Vladimir Srdić
- Edin Suljovrujić

Conference Secretary:

- Aleksandra Stojičić

CONFERENCE PROGRAMME

SYMPOSIUM A Advanced Methods in Synthesis and Processing of Materials

SYMPOSIUM B Advanced Materials for High-Technology Application

SYMPOSIUM C Nanostructured Materials

SYMPOSIUM D Composites

SYMPOSIUM E Biomaterials

GENERAL INFORMATION

DATE AND VENUE: The conference will be held on September 15-19, 2003, at the PLAŽA Hotel, in Herceg Novi, Serbia and Montenegro.

Participants will be accommodated at the Plaža Hotel.

The conference will begin on Monday, September 15, at 09.00 and end on Friday, September 19, 2003 at 12.00.

REGISTRATION: Registration, registration fee payment, conference materials distribution, etc, will take place at the conference desk (Conference Secretariat) open on Sunday, September 14, from 16.00 to 19.00 and on Monday, September 15, from 07.30 to 09.00.

At registration, the participants are requested to submit proof on their advance registration fee payment.

INSTRUCTION FOR AUTHORS: The conference will feature plenary session and poster session.

Oral presentations of papers to be given in PLENARY SESSIONS are limited. Time available for delivery is 30 min for invited and 15 min for other papers including discussion (5-10 min). A graphoscope and video-beam are available.

In POSTER SESSION, the authors are requested to display their papers two hours before the session and to be present at their posters during the session.

PUBLICATION OF PAPERS: Abstracts will be included in a book of abstracts and distributed to each participant at registration.

The Proceedings will be published, as those from the previous conferences, by Trans Tech Publications Ltd., Switzerland, in Mat. Sci. Forum Edition. The papers will be refereed and those selected will be included in the Proceedings Volume.

CONFERENCE AWARDS: The Yugoslav Materials Research Society (Awards Committee: Professors M. Davidović, M. Plavšić and V. Dondur) will award the authors (preferable young members under 35) of the best oral and poster presentation at the conference, and also the authors of highly rated PhD and MSc Theses defended between two conferences. The benefits include free registration, and living expenses at an appropriate rate during the conference.

EXCURSIONS: Excursions can be organised on Wednesday afternoon, Friday after the close of the Conference and on Saturday. Possible destinations are Dubrovnik, Sv. Stefan, Cetinje and Ostrog, per choice.

GENERAL CONFERENCE PROGRAMME

Sunday, September 14, 2003

16⁰⁰-19⁰⁰ Registration

Monday, September 15, 2003

07³⁰-09⁰⁰ Registration

09⁰⁰ **OPENING CEREMONY**
- Introduction and Welcome

09³⁰-13⁰⁰ **Symposium A** (Session I)
15⁰⁰-18³⁰ **Symposium A** (Session II)

SYMPOSIUM A: Advanced Methods in Synthesis and Processing of Materials SYMPOSIUM B: Advanced Materials for High- Technology Application SYMPOSIUM C: Nanostructured Materials SYMPOSIUM D: Composites SYMPOSIUM E: Biomaterials
--

Tuesday, September 16, 2003

09⁰⁰-13¹⁵ **Symposium B** (Session I)
15⁰⁰-18⁴⁵ **Symposium B** (Session II)
20³⁰-22⁰⁰ **Poster Session I** (Symposium A)

Wednesday, September 17, 2003

09⁰⁰-10³⁰ **Symposium B** (Session III)
11⁰⁰-13⁰⁰ **Symposium D** (Session I)
15⁰⁰-19⁰⁰ **Excursion**
20³⁰-22⁰⁰ **Poster Session II** (Symposium B)

Thursday, September 18, 2003

09⁰⁰-13⁰⁰ **Symposium C** (Session I)
15⁰⁰-18¹⁵ **Symposium C** (Session II)
20³⁰-22⁰⁰ **Poster Session III** (Symposiums C, D and E)

Friday, September 19, 2003

09⁰⁰-10¹⁵ **Symposium E** (Session I)
10³⁰-12⁰⁰ **Awards and Closing**

CLOSE OF CONFERENCE

SYMPOSIUM A: ADVANCED METHODS IN SYNTHESIS AND PROCESSING OF MATERIALS

Monday, September 15, 2003

Session I: 09³⁰-13⁰⁰

Chairmen: Dejan Raković, Slobodan Milonjić, Zoran Petrović

09³⁰-10⁰⁰ R. W. Kelsall¹, Z. Ikonić¹, P. Harrison¹, D. J. Paul², S. A. Lynch², R. Bates², D. J. Norris³, S.L. Liew³, A. G. Cullis³, D. D. Arnone⁴, C. R. Pidgeon⁵, P. Murzyn⁵, D. J. Robbins⁶, R. A. Soref⁷

¹School of Electronic and Electrical Engineering, University of Leeds, Leeds, U.K.,

²University of Cambridge, Cavendish Laboratory, Cambridge, U.K., ³Department of Electronic and Electrical Engineering, University of Sheffield, Sheffield, U.K.,

⁴TeraView Ltd, Cambridge, U.K., ⁵Department of Physics, Heriot-Watt University, Riccarton, Edinburgh, , U.K., ⁶Qinetiq, Malvern, U.K., ⁷Sensors Directorate, AFRL/SNHC, Hanscom AFB, U.S.A.

TOWARDS SiGe TERAHERTZ VCSELs

10⁰⁰-10³⁰ T. Makabe, T. Yagisawa, T. Shimada, Z.Lj. Petrović

Department of Electronics and Electrical Engineering, Faculty of Science and Technology, Hiyoshi Yokohama, Japan

PREDICTION OF FUTURE PROFILE UNDER PLASMA CHARGING IN SiO₂ ETCHING

10³⁰-11⁰⁰ M. Fedoroff¹, G. Lefevre¹, M. Duc¹, S. Milonjić², C. Nešković¹

¹Centre d'Etudes de Chimie Métallurgique, C. N. R. S., Vitry, France, ²Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

SORPTION MECHANISMS AND SORPTION MODELS

Break: 11⁰⁰-11³⁰

11³⁰-11⁴⁵ Chr. Argirisus, T. Damjanović, G. Borchardt

TU Clausthal, Institut für Metallurgie, Clausthal-Zellerfeld, Germany

ELECTROPHORETIC DEPOSITION OF THIN SOFC-ELECTROLYTE FILMS ON POROUS La_{0.75}Sr_{0.2}MnO_{3-δ} CATHODES

11⁴⁵-12⁰⁰ T. Damjanović¹, H. Leipner², Chr. Argirisus¹, R. Herbig², R. Weiß³, G. Tomandl², G. Borchardt¹

¹TU Clausthal, Institut für Metallurgie, Clausthal-Zellerfeld, Germany, ²TU Bergakademie Freiberg, Institut für Keramische Werkstoffe, Freiberg, Germany, ³Schunk Kohlenstofftechnik GmbH, Gießen, Germany
SOL-GEL ROUTE FOR ELECTROPHORETIC DEPOSITION OF MULLITE
DIFFUSION BARRIERS ON C/C-Si-SiC-COMPOSITES

12⁰⁰-12¹⁵ B. Jokanović¹, T. Damjanović¹, R. Weiß², G. Borchardt¹
¹TU Clausthal, Institut für Metallurgie, Clausthal-Zellerfeld, Germany, ²Schunk Kohlenstofftechnik GmbH, Gießen, Germany
MODELING OF ELECTROPHORETIC DEPOSITION OF OXIDES ON C/C-Si-SiC-COMPOSITES

12¹⁵-12³⁰ Ž. P. Čančarević¹, J. Ch. Schöen¹, M. Jansen¹
¹Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany
STRUCTURE PREDICTION OF SOLIDS: HEURISTIC ALGORITHMS FOR
LOCAL OPTIMIZATION ON HARTREE-FOCK LEVEL

12³⁰-12⁴⁵ B.D. Stojanović^{1,2}, G.C.C. Costa², A.Z. Simões², M. Cilense², J.A. Varela²
¹Center for Multidisciplinary Studies UB, Belgrade, Serbia and Montenegro, ²Instituto de Química-UNESP, Araraquara, Brasil
THE MICROSTRUCTURE OF BARIUM BISMUTH TANTALATE THIN FILMS
OBTAINED BY POLYMERIC PRECURSOR METHOD

12⁴⁵-13⁰⁰ B. Matović¹, G. Rixecker², F. Aldinger², S. Bošković¹
¹Institute of Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro; ²Max-Planck-Institute, Stuttgart, Germany
PHASE EVOLUTION OF Si₃N₄ CERAMIC WITH ADDITIVES FROM THE Li₂O-Y₂O₃

Break: 13⁰⁰-15⁰⁰

Session II: 15⁰⁰-18³⁰

Chairmen: Milorad Davidović, Vera Dondur

15⁰⁰-15³⁰ Ph. Colomban
LADIR-UMR 7075, CNRS & Université P. & M. Curie, Thiais, France
RAMAN / RAYLEIGH STUDY OF NANOPHASES

15³⁰-15⁴⁵ D. Đurović¹, V. Pejović², S. Bošković¹
¹Institute of Nuclear Sciences "Vinča", Belgrade, ²D.D. IRITEL, Belgrade, Serbia and Montenegro
DECREASE OF THE BaTiO₃ FORMATION TEMPERATURE

- 15⁴⁵-16⁰⁰ V. Petrović¹, M.M. Ristić²
¹*Electrotechnical Colledge, Belgrade*, ²*Serbian Academy of Sciences and Arts, Belgrade Serbia and Montenegro*
 INFLUENCE OF MECHANICAL ACTIVATION ON SINTERING KINETICS
 CaTiO₃
- 16⁰⁰-16¹⁵ V. Rajković¹, O. Erić¹, D. Božić¹, M. Mitkov¹, E. Romhanji²
¹*Institute of Nuclear Sciences "Vinča", Belgrade*, ²*Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro*
 THE THERMAL STABILITY OF MECHANICALLY ALLOYED COPPER
 WITH 3 AND 4WT.% A₂O₃
- 16¹⁵-16³⁰ Z. Lj. Petrović¹, G. Malović¹, Ž. Nikitović¹, A. Strinić¹, S. Dujko¹, Z. Raspopović¹,
 M. Radmilović-Radenović¹, O. Šašić²
¹*Institute of Physics, Zemun*, ²*Faculty of Transport and Traffic Engineering, University of Belgrade, Belgrade, Serbia and Montenegro*
 DATA BASES FOR MODELING PLASMA DEVICES FOR PROCESSING OF
 INTEGRATED CIRCUITS
- 16³⁰-16⁴⁵ M. Zlatanović¹, N. Popović², Ž. Bogdanov², S. Zec²
¹*Faculty of Electrical Engineering, Belgrade*, ²*Institute of Nuclear Sciences, Vinča, Belgrade, Serbia and Montenegro*
 PLASMA OXIDATION OF SALT BATH NITRIDED STEEL SAMPLES
- 16⁴⁵-17⁰⁰ B. Kaluđerović¹, M. Trtica¹, M. Srećković², B. Babić¹
¹*Institute of Nuclear Sciences "Vinča", Belgrade*, ²*Faculty of Electrical Engineering, Belgrade, Serbia and Montenegro*
 MODIFICATION OF CARBON CLOTH BY INTERACTION WITH PULSED CO₂
 LASER

Break: 17⁰⁰-17³⁰

- 17³⁰-17⁴⁵ F. Bardi¹, M. Cabibbo¹, E. Evangelista¹, S. Spigarelli¹, M. Vukčević², K. Delijić²
¹*INFN/Department of Mechanics, University of Ancona, Ancona, Italy*, ²*Faculty of Metallurgy and Technology, Podgorica, Serbia and Montenegro*
 AN ANALYSIS OF HOT DEFORMATION OF AN Al-Cu-Mg ALLOY
 PRODUCED BY POWDER METALLURGY

- 17⁴⁵-18⁰⁰ A. Nikolić¹, Lj. Petrov¹, Đ. Koruga¹, S. Mihajlović²
¹*Faculty of Mechanical Engineering, Belgrade*, ²*Geomagnetic Institute, Grocka, Serbia and Montenegro*
 MAGNETIC FIELD INTENSITY MEASUREMENTS OF C₆₀ THIN FILMS UNDER DIFFERENT LIGHT INFLUENCES
- 18⁰⁰-18¹⁵ V. Mujičić¹, V. Jokanović², Lj. Kostić-Gvozdenović³, N. Blagojević³, M. Krgović⁴, Đ. Janačković³
¹*Aluminium Plant Podgorica, Podgorica*, ²*Institute of Technical Sciences of SASA, Belgrade*, ³*Faculty of Technology and Metallurgy, Belgrade*, ⁴*Faculty of Metallurgy and Technology, Podgorica, Serbia and Montenegro*
 Na-ALUMINATE SOLUTION AS A PRECURSOR FOR SOL-GEL SYNTHESIS OF THE ALUMINA POWDERS
- 18¹⁵-18³⁰ S. Sređić¹, T. Čajkovski², M. Davidović^{2,3}, D. Čajkovski², V. Likar-Smiljanić³, R. Biljić⁴, U. B. Mioč⁵, M. Marinović-Cincović²
¹*Institute of Mining, Prijedor, Bosnia and Herzegovina (Serbian Republic)*, ²*Vinča Institute of Nuclear Sciences, Belgrade*, ³*Faculty of Electrical Engineering, University of Belgrade, Belgrade*, ⁴*VTA Žarkovo, Belgrade*, ⁵*Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro*
 ELECTRICAL PROPERTIES OF EXCHANGED MONTMORILLONITE CLAYS

SYMPOSIUM B: ADVANCED MATERIALS FOR HIGH-TECHNOLOGY APPLICATION

Tuesday, September 16, 2003

Session I: 09⁰⁰-13¹⁵

Chairmen: Momčilo Stevanović, Nebojša Romčević

09⁰⁰-09³⁰ Le Van Khoi

Institute of Physics, Polish Academy of Sciences, Warsaw, Poland

IMPURITY LEVELS IN DOPED WIDE-GAP II-VI BULK SEMIMAGNETIC SEMICONDUCTORS

09³⁰-10⁰⁰ V. Stamenković, B. Blizanac, B. Grgur, M. Arenz, P. Ross, N. M. Marković

Materials Sciences Division Lawrence Berkeley National Laboratory University of California, Berkeley, USA

NEW MATERIALS FOR FUEL CELL REACTIONS

10⁰⁰-10³⁰ J.-L.Vignes¹, D.Michel¹, T.di Costanzo¹, C.Frappart¹, A.N.Khodan²

¹C.E.C.M. C.N.R.S. Vitry-sur-Seine, France, ²Institute of Physical Chemistry RAS, Moscow, Russia

NEW METHOD OF POROUS OXIDE SYNTHESIS: ALUMINA AND ALUMINA BASED COMPOUNDS

Break 10³⁰-11⁰⁰

11⁰⁰-11¹⁵ V. D. Jović

Center for Multidisciplinary Studies, University of Belgrade, Belgrade, Serbia and Montenegro

CORROSION OF Ti₃SiC₂ AND Ti₄AlN₃ IN CONCENTRATED HCl SOLUTIONS

11¹⁵-11³⁰ V. Maksimović¹, S. Zec¹, V. Radmilović², M.T. Jovanović¹

¹Department of Materials Science, Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro, ²Department of Materials Science and Engineering, University of California, Berkeley, U.S.A.

AGING OF A COMMERCIAL Al-Cu-Si BASED ALLOY MODIFIED WITH GERMANIUM

11³⁰-11⁴⁵ M. Čančarević, M. T. Jovanović, S. Zec

Department of Materials Science, Institute of Nuclear Sciences »Vinča«, Belgrade, Serbia and Montenegro

MECHANISM AND KINETICS OF AGING OF HIGH STRENGTH Cu-5wt.% Ni-2.5wt.% Ti ALLOY

11⁴⁵-12⁰⁰ S. Tadić, M. T. Jovanović, I. Bobić, S. Zec, B. Dimčić
Department of Materials Science, Institute of Nuclear Sciences »Vinča«, Belgrade, Serbia and Montenegro

TiAl – A NEW HIGH TEMPERATURE MATERIAL FOR TURBOCHARGER ROTORS

12⁰⁰-12¹⁵ M. T. Jovanović, S. Tadić, S. Zec, Z. Mišković, I. Bobić
Department of Materials Science, Institute of Nuclear Sciences »Vinča«, Belgrade, Serbia and Montenegro

THE EFFECT OF α/β VOLUME FRACTION RATIO ON MICROSTRUCTURE AND MECHANICAL PROPERTIES OF A COMMERCIAL TITANIUM ALLOY

12¹⁵-12³⁰ B. Dimčić, S. Tadić, M.T. Jovanović
Department of Material Science, Institute of Nuclear Sciences, Vinča, Belgrade, Serbia and Montenegro

HIGH-TEMPERATURE DEFORMATION BEHAVIOUR OF Ti₃Al-11Nb INTERMETALLIC

12³⁰-12⁴⁵ S. Tadić, B. Dimčić, M.T. Jovanović
Department of Material Science, Institute of Nuclear Sciences, Vinča, Belgrade, Serbia and Montenegro

SUPERPLASTICITY OF HIGH – PURITY Ti-6Al-4V ALLOY

12⁴⁵-13⁰⁰ V. Asanović, K. Delijić, Z. Leka
Faculty of Metallurgy and Technology, Podgorica, Serbia and Montenegro

AGING EFFECTS IN Cu-Zn-Al SHAPE MEMORY ALLOY

13⁰⁰-13¹⁵ Z. Cvijović¹, G. Radenković², V. Maksimović³, B. Dimčić³
¹Faculty of Technology and Metallurgy, Belgrade, ²Faculty of Mechanical Engineering, Niš, ³Department of Material Science, Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

PREDICTION OF PRECIPITATION BEHAVIOR OF SELECTED ALLOYS USING ANOVA METHOD

Break: 13¹⁵-15⁰⁰

Session II: 15⁰⁰-18⁴⁵

Chairmen: Đuro Koruga, Miroslav Dramićanin, Nikola Cvjetićanin

- 15⁰⁰-15¹⁵ G. Stamboliev, D. Miličević, E. Suljovrujić, D. Kostoski
Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro
 EFFECT OF POLAR ALUMINIUM TRIHYDRATE MOLECULES ON THE
 DIELECTRIC RELAXATIONS OF LOW-DENSITY POLYETHYLENE
- 15¹⁵-15³⁰ S. Galović, D. Kostoski
Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro
 DETERMINATION OF THE THERMAL PROPERTIES OF A THIN METALLIC
 FILM/POLYMER/THIN METALLIC FILM SYSTEM BY PHOTOTHERMAL
 SPECTROSCOPY
- 15³⁰-15⁴⁵ V. V. Antić¹, J. Donlagić²
¹*IChTM-Center for Chemistry, Belgrade*, ³*Faculty of Technology and Metallurgy,*
Belgrade, Serbia and Montenegro
 THE INFLUENCE OF THE STRUCTURE AND COMPOSITION ON THE
 PROPERTIES OF POLY(ESTER-SILOXANE) ELASTOMERS
- 15⁴⁵-16⁰⁰ J. Budinski-Simendić¹, T. Dikić¹, M. Ilavsky², K. Dušek²
¹*University of Novi Sad, Faculty of Technology, Serbia and Montenegro*, ²*Institute*
for Macromolecular Chemistry, Academy of Sciences, Czech Republic
 EQUILIBRIUM SWELLING BEHAVIOUR OF POLYURETHANES WITH
 ISOCYANURATE CROSSLINKS
- 16⁰⁰-16¹⁵ G. Ćirić-Marjanović¹, I. Krakovsky², J. Budinski-Simendić³, S. Mentus¹
¹*Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia and*
Montenegro, ²*Faculty of Mathematics and Physics, Charles University, Prague,*
Czech Republic, ³*Faculty of Technology, University of Novi Sad, Novi Sad, Serbia*
and Montenegro
 ELECTROCHEMICAL POLYMERIZATION OF 2-METHYL-1-
 NAPHTHYLAMINE IN AN ACIDIC PERCHLORATE AQUEOUS MEDIUM
- 16¹⁵-16³⁰ A. Đorđević¹, M. Vojinović-Miloradov¹, A. Kapor¹, D. Lazar¹, D. Petrović², M.
 Hegediš
¹*University of Novi Sad, Faculty of Natural Sciences and Mathematics, Novi Sad,*
²*University of Novi Sad, Technical Faculty, Novi Sad, Serbia and Montenegro*
 CRUCIAL ROLE OF ALKYL-SUBSTITUTED BENZENES IN THE
 FORMATION OF INTERCALATE DERIVATIVES OF C₆₀
- 16³⁰-16⁴⁵ L. Matija¹, Đ. Koruga², M. Romčević³, N. Romčević³, N. Ignjatović¹, D. Uskoković¹
¹*Institute of Technical Sciences of SASA, Belgrade*, ²*Faculty of Mechanical*
Engineering, Belgrade, ³*Institute of Physics, Belgrade, Serbia and Montenegro*
 FT-IR AND RAMAN STUDY OF COLLAGEN HYDROLYSATE AND C₆₀(OH)₂₄
 INTERACTION

- 16⁴⁵-17⁰⁰ A. Vasić¹, P. Osmokrović², S. Stanković³, B. Lončar⁴
¹Faculty of Mechanical Engineering, Belgrade, ²Faculty of Electrical Engineering,
 Belgrade, ³Institute of Nuclear Sciences Vinča, Belgrade, ⁴Faculty of Technology and
 Metallurgy, Belgrade, Serbia and Montenegro
 STUDY OF THE INCREASED TEMPERATURE INFLUENCE ON
 DEGRADATION OF THE PHOTODETECTORS THROUGH IDEALITY
 FACTOR

Break: 17⁰⁰-17³⁰

- 17³⁰-17⁴⁵ M. Rakin¹, Z. Cvijović¹, V. Grabulov², N. Gubeljak³, A. Sedmak⁴
¹Faculty of Technology and Metallurgy, Belgrade, ²Military Technical Institute,
 Belgrade, ³Faculty of Mechanical Engineering, Maribor, Slovenia, ⁴Faculty of
 Mechanical Engineering, Belgrade, Serbia and Montenegro,
 THE INFLUENCE OF MICROSTRUCTURE ON DUCTILE FRACTURE
 INITIATION IN LOW-ALLOYED STEEL
- 17⁴⁵-18⁰⁰ J. Belošević-Čavor, B. Cekić, N. Novaković, N. Ivanović, M. Manasijević
 Institute of Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro
 INFLUENCE OF ANNEALING ON STRUCTURE AND MAGNETIC
 PROPERTIES OF LAVES PHASE HfFe₂
- 18⁰⁰-18¹⁵ I. Radisavljević¹, N. Ivanović¹, V. Koteski², B. Cekić¹, M. Manasijević¹, D.
 Marjanović¹
¹Laboratory of Nuclear and Plasma Physics, Institute of Nuclear Sciences "Vinča",
 Belgrade, Serbia and Montenegro, ²Present address: Hahn-Meitner Institut, Berlin
 GmbH, Bereich Strukturforschung, Berlin, Germany
 CALCULATIONS OF TRANSITION METAL LOCAL STRUCTURES
 MAGNETIC PROPERTIES IN Hf INTERMETALLIC COMPOUNDS
- 18¹⁵-18³⁰ N. Novaković, N. Ivanović, I. Radisavljević, J. Belošević-Čavor, B. Cekić
 Laboratory of Nuclear and Plasma Physics, Institute for Nuclear Sciences Vinča,
 Belgrade, Serbia and Montenegro
 STRUCTURAL STABILITY OF SOME Hf – TRANSITION METAL
 INTERMETALLIC COMPOUNDS OF 50:50% ATOMIC RATIO
- 18³⁰-18⁴⁵ M.D. Damićanin¹, Z. Ristovski²
¹Institute of Nuclear Sciences "Vinča," Belgrade, Serbia and Montenegro, ²School of
 Physical and Chemical Sciences, Queensland University of Technology, Brisbane,
 Australia
 THERMAL DIFFUSIVITY OF COLD SINTERED Co

Wednesday, September 17, 2003

Session III: 09⁰⁰-10³⁰

Chairman: Miodrag Zlatanović

09⁰⁰-09¹⁵ M. D. Dramićanin

Institute of Nuclear Sciences "Vinča," Belgrade, Serbia and Montenegro
NONDESTRUCTIVE EVALUATION OF SEMICONDUCTOR
THERMOELASTIC PROPERTIES BY MEANS OF PHOTOACOUSTIC
SPECTROSCOPY

09¹⁵-09³⁰ B.R. Jovanić¹, B. Viana²

¹Institute of Physics, Center of Experimental Physics, Lab. Multidisc.Res., Zemun, Serbia and Montenegro, ²Ecole Nationale Supérieure de Chimie de Paris, Chimie Appliquée de l'Etat Solide, E.N.S.C.P., Paris Cédex 05, France
THE EFFECT OF PRESSURE ON THE LUMINESCENCE OF LaMgAl₁₁O₁₉:Cr³⁺, Nd³

09³⁰-09⁴⁵ N. Ivanović¹, V. Koteski^{1,2}, H.-E. Mahnke²

¹Laboratory of nuclear and plasma physics, Institute of nuclear sciences "Vinča", Belgrade, Serbia and Montenegro, ²Hahn-Meitner Institut, Berlin GmbH, Bereich Strukturforschung, Berlin, Germany
SITE OCCUPATION PREFERENCES IN MULTICOMPONENT
SEMICONDUCTORS: THE CdZnTe CASE

09⁴⁵-10⁰⁰ N. Kulagin

Kharkov National University for Radioelectronics, Kharkov, Ukraine
STRUCTURE AND PROPERTIES OF NON-STOICHIOMETRICAL
PEROVSKITES DOPED WITH ME OR/AND RE IONS

10⁰⁰-10¹⁵ N. Romčević¹, J. Trajić¹, M. Romčević¹, A. Milutinović¹, A.J. Nadolny², B. Taliashvili², V.N. Nikiforov³

¹ Institute of Physics, Belgrade, Serbia and Montenegro, ² Institute of Physics, Polish Academy of Sciences, Warsaw, Poland, ³ Department of Low-Temperature Physics, Moscow State University, Moscow, Russia
FAR-INFRARED SPECTROSCOPY OF Pb_{1-x}Mn_xTe ALLOYS

10¹⁵-10³⁰ S.R. Lukić¹, D.M. Petrović¹, V.B. Petrović¹, D.D. Petrović²

¹Department of Physics, Faculty of Sciences, Novi Sad, ²Institute of Energy and Process Engineering, Novi Sad, Serbia and Montenegro
DISPERSION OF REFRACTIVE INDEX OF THE NON-CRYSTALLINE
CHALCOGENIDES IN Cu-As-Se SYSTEM

Break: 10³⁰-11⁰⁰

SYMPOSIUM D: COMPOSITES

Session I: 11⁰⁰-13⁰⁰

Chairmen: Radoslav Aleksić, Mira Vukčević, Đorđe Janačković

- 11⁰⁰-11³⁰ M.M. Stevanović, D.S. Marković, D.R. Pešikan-Sekulić
Institute of Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro
EFFECT OF STACKING SEQUENCE ON TENSILE STRENGTH OF
CARBON/EPOXY LAMINATES
- 11³⁰-11⁴⁵ I. Živković¹, Lj. Brajović², P. Uskoković³, R. Aleksić³
¹*Institute of Security, Belgrade*, ²*Civil Engineering Faculty, Belgrade*, ³*Faculty of
Technology and Metallurgy, Belgrade, Serbia and Montenegro*
TESTING OF LAMINAR THERMOPLASTIC GLASS FIBRE-PVB COMPOSITE
MATERIAL USING OPTICAL FIBERS AS SENSORS
- 11⁴⁵-12⁰⁰ Lj. Brajović¹, Z. Mišković¹, P. Uskoković², M. Simić¹, S. Putić², R. Aleksić²
¹*Faculty of Civil Engineering, Belgrade*, ²*Faculty of Technology and Metallurgy,
Belgrade, Serbia and Montenegro*
FATIGUE DAMAGE DETECTION IN COMPOSITE RODS USING FIBER
OPTIC INTENSITY BASED SENSORS
- 12⁰⁰-12¹⁵ T. Volkov-Husović¹, R.M. Jančić¹, J. Majstorović², M. Cvetković²
¹*Faculty of Technology and Metallurgy, Belgrade*, ²*Faculty of Mining and Geology,
Belgrade, Serbia and Montenegro*
THERMAL STABILITY BEHAVIOR ANALYSIS USING SONIC
MEASUREMENTS
- 12¹⁵-12³⁰ J. Budinski-Simendić¹, Z. Petrović², V. Lazić¹, R. Radičević¹, V. Divjaković³
¹*University of Novi Sad, Faculty of Technology, Novi Sad*, ²*Kansas Polymer
Research Center, Pittsburg State University, USA*, ³*Institute for Physics, Faculty of
Natural Sciences, Novi Sad, Serbia and Montenegro*
THE EFFECT OF NUCLEANTS ON THE CRYSTALLIZATION BEHAVIOR
OF ISOTACTIC POLYPROPYLENE
- 12³⁰-12⁴⁵ V. Panić¹, A. Dekanski¹, S. Gojković², S. Milonjić³, V. Mišković-Stanković², B.
Nikolić²
¹*ICTM – Department of Electrochemistry, Belgrade*, ²*Faculty of Technology and
Metallurgy, Belgrade*, ³*Institute of Nuclear Sciences Vinča, Belgrade, Serbia and
Montenegro*
INFLUENCE OF THE OXIDE SOL PROPERTIES ON THE CAPACITIVE
BEHAVIOR OF CARBON SUPPORTED HYDROUS RUTHENIUM OXIDE

12⁴⁵-13⁰⁰ M. Điporović¹, E. Dingova², J. Miljković¹

¹*Faculty of Forestry of Belgrade University, Belgrade,* ²*Chemical Industry "HIPOL" plc, Odžaci, Serbia and Montenegro*

THE EFFECTS OF MgO ON SOME PROPERTIES OF POLYPROPYLENE -
WOOD COMPOSITES

SYMPOSIUM C: NANOSTRUCTURED MATERIALS

Thursday, September 18, 2003

Session I: 09⁰⁰-13⁰⁰

Chairmen: Snežana Bošković, Jovan Šetrajčić, Vladimir Jović

09⁰⁰-09³⁰ M. W. Barsoum

Department of Materials Science and Engineering, Drexel University, Philadelphia, USA

DUCTILE, MACHINABLE TERNARY CARBIDES AND NITRIDES:

A NEW CLASS OF SOLIDS: POLYCRYSTALLINE NANOLAMINATES

09³⁰-09⁴⁵ G. A. Battiston, D. Berto, G. Carta, R. Gerbasi

CNR, Istituto di Chimica Inorganica e delle Superfici, Padova, Italy

KINETIC STUDIES OF MOCVD PRECURSORS AS A BASIS TO STEER AL₂O₃ FILMS CHARACTERISTICS

09⁴⁵-10⁰⁰ M. Drofenik¹, D. Makovec²

¹Faculty of Chemistry and Chemical Engineering, University of Maribor, ²Ceramics Department, Jožef Stefan Institute, Ljubljana, Slovenia

THE SYNTHESIS OF CARBON NANOSTRUCTURES WITH MECHANICAL ALLOYING

10⁰⁰-10¹⁵ J. Ceulemans

K.U.Leuven, Leuven, Belgium

n-ALKANE NANOPARTICLES IN CRYOGENIC

TRICHLOROFLUOROMETHANE/n-ALKANE SYSTEMS: THEIR USE IN THE STUDY OF THE σ -BASICITY OF n-ALKANES

Break: 10¹⁵-10⁴⁵

10⁴⁵-11⁰⁰ N. Noskova, N. Vildanova, R. Churbaev

Institute of Metal Physics of UD RAS, Ekaterinburg, Russia

THE DEFORMATION AND FAILURE OF HIGH-STRENGTH NANOSTRUCTURED ALLOYS BASED ON FE AND AL

11⁰⁰-11¹⁵ N. Noskova, A. Potapov, V. Shulika, V. Lukshina,

Institute of Physic Metals UD RAS, Ekaterinburg, Russia

THE STRUCTURE AND MAGNETIC PROPERTIES INDUCED BY DIFFERENT
CONDITION OF NANOCRYSTALLIZATION IN FE AND CO BASED
AMORPHOUS SOFT MAGNETIC ALLOYS

11¹⁵-11³⁰ Z.Lj. Petrović¹, S. Sakadžić¹, N. Spasojević¹, J. Matsui², T. Makabe²

¹*Institute of Physics, Zemun, Serbia and Montenegro*, ²*Keio University 3-14-1
Hiyoshi, Yokohama, Japan*

COMPARISON OF DIRECT NUMERICAL PROCEDURE AND MONTE CARLO
TECHNIQUE TO DETERMINE THE CHARGING EFFECTS IN SUBMICRON
STRUCTURES

11³⁰-11⁴⁵ P. Tomić¹, M. Davidović²

¹*Alumina Plant "Birač", Zvornik, Serbian Republic, Bosnia and Herzegovina*, ²*Vinča
Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro*

CRZSTALLIZATION KINETICS OF Fe-B BASED AMORPHOUS ALLOYS
STUDIED *IN-SITU* USING X-RAYS DIFFRACTION AND DIFFERENTIAL
SCANNING CALORIMETRY

11⁴⁵-12⁰⁰ N. Mitrović, R. Simeunović, A. Maričić, B. Jordović

*Joint Laboratory for Advanced Materials of SASA, Section for Amorphous Systems,
Technical Faculty Čačak, Čačak, Serbia and Montenegro*

SYNTHESIS AND PREPARATION OF NEW Fe-BASED SOFT MAGNETIC
AMORPHOUS ALLOYS WITH A LARGE SUPERCOOLED LIQUID REGION

12⁰⁰-12¹⁵ J. Radovanović^{1,2}, V. Milanović², Z. Ikonić^{2,3}, D. Indin^{2,3}

¹*Institute of Physics, Belgrade*, ²*Faculty of Electrical Engineering, Belgrade, Serbia
and Montenegro*, ³*Institute of Microwaves and Photonics, School of Electronic and
Electrical Engineering, University of Leeds, Leeds, UK*

OPTIMIZATION OF INTERSUBBAND OPTICAL NONLINEARITIES IN
CONTINUALLY GRADED AlGaIn QUANTUM WELL STRUCTURES

12¹⁵-12³⁰ A. Mirčetić^{1,2}, D. Indin^{1,3}, P. Harrison³, Z. Ikonić^{1,3}, R. W. Kelsall³, V. Milanović¹

¹*Faculty of Electrical Engineering, Belgrade*, ²*"Telekom Srbija" a.d., Zone of
Maintenance Pančevo, Pančevo, Serbia and Montenegro*, ³*Institute of Microwaves
and Photonics, School of Electronic and Electrical Engineering, University of Leeds,
Leeds, UK*

GaAs/AlGaAs QUANTUM CASCADE LASER WITH HIGHLY DIAGONAL
TRANSITIONS

12³⁰-12⁴⁵ B.S. Tošić¹, V.D. Sajfert², J.P. Šetrajčić¹, S.K. Jaćimovski¹

¹*Department of Physics, Faculty of Sciences, University of Novi Sad*, ²*Technical
Faculty "M. Pupin", Zrenjanin, University of Novi Sad, Serbia and Montenegro*

THERMODYNAMICAL AND KINEMATICAL PARAMETERS OF
CYLINDRICAL QUANTUM WIRES

12⁴⁵-13⁰⁰ R. Ramović¹, P. Lukić²

¹Faculty of Electrical Engineering, Belgrade, ²Faculty of Mechanical Engineering,
Belgrade, Serbia and Montenegro

SURFACE DENSITY ANALYTICAL MODEL OF TWO-DIMENSIONAL
ELECTRON GAS IN HEMT STRUCTURES

Break: 13⁰⁰-15⁰⁰

Session II: 15⁰⁰-18¹⁵

Chairmen: Ljiljana Čerović, Vladimir Srdić

15⁰⁰-15³⁰ D. Hourlier-Bahloul

UMR CNRS 6638, SPCTS, Limoges, Cedex, France

NEW PROCESS ROUTES FOR ADVANCED CERAMIC NANOMATERIALS

15³⁰-16⁰⁰ A. Montone¹, M. Vittori Antisari¹, J. Grbović^{1,2}, E. Bonetti³, L. Pasquini³, A.

Bassetti³, A. Fiorini³

¹Materials and Technology Unit, ENEA C.R. Casaccia, Roma, Italy, ²Institute of
Nuclear Sciences Vinča Department of Material Science, Belgrade, Serbia and
Montenegro, ³Department of Physics, University of Bologna and INFN, Italy

MICROSTRUCTURE OF Mg BASED NANOCOMPOSITE FOR HYDROGEN
STORAGE

16⁰⁰-16¹⁵ V.V. Srdić¹, K.A. Kumar², M. Winterer², H. Hahn²

¹Department of Materials Engineering, Faculty of Technology, University of Novi
Sad, Serbia and Montenegro, ²Institute for Materials Science, Darmstadt University
of Technology, Germany

SYNTHESIS AND SINTERABILITY OF NANOCRYSTALLINE TITANIA
POWDERS

16¹⁵-16³⁰ S. Stojanović, F. Bauer, H.-J. Gläsel, R. Mehnert

Leibniz-Institut für Oberflächenmodifizierung, Leipzig, Germany

SCRATCH AND ABRASION RESISTANT POLYMERIC NANOCOMPOSITES –
PREPARATION, CHARACTERIZATION AND APPLICATIONS

16³⁰-16⁴⁵ R. Kostić¹, N. Romčević¹, M.I. Čomor², M. Romčević¹, M. Grujić¹, V.V. Vodnik²,
J.M. Nedeljković²

¹Institute of Physics, Belgrade, ²Vinča Institute of Nuclear Sciences, Belgrade, Serbia
and Montenegro

FAR-INFRARED PHONON SPECTROSCOPY OF Cd_{1-x}Mn_xS QUANTUM DOTS

- 16⁴⁵-17⁰⁰ Ž. N. Todorović¹, S. K. Milonjić¹, S. P. Zec¹, V. T. Dondur²
¹*Vinča Institute of Nuclear Sciences, Belgrade*, ²*Faculty of Physical Chemistry, Belgrade, Serbia and Montenegro*
 INFLUENCE OF SOLID/LIQUID RATIO ON THE POINT OF ZERO CHARGE OF ALUMINA
- 17⁰⁰-17¹⁵ A. Košak¹, D. Makovec¹, M. Drofenik²
¹*»Jožef Stefan« Institute, Ljubljana*, ²*Faculty of Chemistry and Chemical Engineering, Maribor, Slovenia*
 MICROEMULSION SYNTHESIS OF MnZn-FERRITE NANOPARTICLES
- 17¹⁵-17³⁰ V. Uskoković¹, M. Drofenik²
¹*Advanced Materials Department, Institute "Jožef Stefan", Ljubljana*, ²*Faculty of Chemistry and Chemical Engineering, Maribor, Slovenia*
 SYNTHESIS OF NANOCRYSTALLINE NICKEL-ZINC FERRITES VIA A MICROEMULSION ROUTE
- 17³⁰-17⁴⁵ B. Babić¹, N. Krstajić²
¹*Institute of Nuclear Sciences Vinča, Belgrade*, ²*Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia and Montenegro*
 MORPHOLOGY AND ELECTROCHEMISTRY OF PLATINUM / CARBON AEROGEL NANOSTRUCTURES
- 17⁴⁵-18⁰⁰ A.V. Tripković, S. Štrbac, K.Đ. Popović, J.D. Lović
¹*ICTM – Institute of Electrochemistry, University of Belgrade, Belgrade, Serbia and Montenegro*
 STUDY OF SUPPORTED Pt AND PtRu CATALYSTS: METHANOL AND FORMIC ACID OXIDATION
- 18⁰⁰-18¹⁵ B. Gaković, S. Petrović, T. Nenadović, M. Trtica
¹*Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro*
 LASER INDUCED GRAINY STRUCTURE DEVELOPED ON TiN COATINGS

SYMPOSIUM E: BIOMATERIALS

Friday, September 19, 2003

Session I: 09⁰⁰-10¹⁵

Chairmen: Milenko Plavšić, Nenad Ignjatović

09⁰⁰-09¹⁵ D. Raković¹, M. Dugić², M. Plavšić³

¹Faculty of Electrical Engineering, Belgrade, ²Department of Physics, Faculty of Science, Kragujevac, ³Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

THE POLYMER CONFORMATIONAL TRANSITIONS: A QUANTUM DECOHERENCE THEORY APPROACH

09¹⁵-09³⁰ Đ. Koruga¹, A. Tomić¹, Z. Ratkaj¹, L. Matija²

¹Faculty of Mechanical Engineering, University of Belgrade, Belgrade, ²Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro

GIBBSON: PEPTIDE PLAIN AS A UNIQUE BIOLOGICAL NANOSTRUCTURE

09³⁰-09⁴⁵ B. Obradović¹, B. Bugarski¹, D. Bugarski², M. Petakov², G. Jovčić², N. Stojanović², G. Vunjak-Novaković³

¹Chemical Engineering Department, Faculty of Technology and Metallurgy, Belgrade;

²Institute for Medical Research, Belgrade, Serbia and Montenegro;

³Division of Health Sciences and Technology, Massachusetts Institute of Technology, Cambridge, USA

CELL SUPPORT STUDIES AIMED FOR CARTILAGE TISSUE ENGINEERING IN PERFUSED BIOREACTORS

09⁴⁵-10⁰⁰ N. Ignjatović¹, A. Nastasović², V. Laninović³, A. Onjia⁴, M. Miljković⁵, D. Uskoković¹

¹Institute of Technical Sciences of SASA, Belgrade, ²ICH_{TM}- Center for Chemistry, Belgrade, ³IMS Institute, Belgrade, ⁴Vinča Institute of Nuclear Sciences, Belgrade,

⁵Laboratory for Electronic Microscopy, Medical Faculty, Niš, Serbia and Montenegro

PHYSICO-CHEMICAL PROPERTIES OF POLYMERIC AND COMPOSITE BIORESORBABLE BARRIER MEMBRANES

10⁰⁰-10¹⁵ J. Jovanović¹, B. Adnadjević², S. Ostojić³, M. Kićanović³, D. Uskoković¹

¹Institute of Technical Sciences of SASA, Belgrade, ²Faculty of Physical Chemistry, Belgrade, ³Institute of General and Physical Chemistry, Belgrade, Serbia and Montenegro

AN INVESTIGATION OF THE DEHYDRATION OF THE SUPERABSORBING POLYACRYLIC HYDROGELS

POSTER SESSION I

Tuesday, September 16, 2003, 20³⁰-22⁰⁰

SYMPOSIUM A: ADVANCED METHODS IN SYNTHESIS AND PROCESSING OF MATERIALS

- P.S.A.1. Lj. Čerović¹, J. Filipović², I. Popović²
¹*Vinča Institute of Nuclear Sciences, Belgrade*, ²*Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro*
 GELCASTING OF ALUMINA
- P.S.A.2. B. Adnađević¹, J. Jovanović², S. Milenković¹
¹*Faculty of Physical Chemistry, Belgrade*, ²*Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro*
 MICROWAVE PROCESS FOR THE PREPARATION OF THE SODIUM SILICATE POWDERS
- P.S.A.3. N. Cvjetičanin¹, D. Jugović², M. Mitrić³, M. Miljković⁴, S. Mentus¹
¹*Faculty of Physical Chemistry, University of Belgrade, Belgrade*, ²*Institute of Technical Sciences of SASA, Belgrade*, ³*Laboratory for Theoretical and Condensed Matter Physics, Institute of Nuclear Sciences "Vinča", Belgrade*, ⁴*Faculty of Medicine, Niš, Serbia and Montenegro*
 SYNTHESIS OF $\text{LiMn}_{2-x}\text{Ni}_x\text{O}_4$ AND $\text{LiCo}_{1-x}\text{Ni}_x\text{O}_2$ BY GLYCINE-NITRATE METHOD
- P.S.A.4. D. Jugović¹, M. Mitrić², N. Cvjetičanin³, M. Miljković⁴, V. Jakanović¹, S. Mentus³, D. Uskoković¹
¹*Institute of Technical Sciences of SASA, Belgrade*, ²*Vinča Institute of Nuclear Sciences, Laboratory for Theoretical and Condensed Matter Physics, Belgrade*, ³*Faculty of Physical Chemistry, University of Belgrade, Belgrade*, ⁴*Faculty of Medicine, University of Niš, Serbia and Montenegro*
 PROPERTIES OF LITHIUM MANGANATE POWDERS OBTAINED BY ULTRASONIC SPRAY PYROLYSIS
- P.S.A.5. I. Nikolić¹, D. Blečić¹, N. Blagojević¹, V. Radmilović², K. Kovačević³
¹*University of Montenegro, Faculty of Metallurgy and Technology, Podgorica*, ²*University of Belgrade, Faculty of Technology and Metallurgy, Belgrade*, ³*Institute for Ferrous Metallurgy, Nikšić, Serbia and Montenegro*
 INFLUENCE OF SEED GRAIN SIZE AND OXALIC ACID ON THE PARTICLE SIZE DISTRIBUTION OF $\text{Al}(\text{OH})_3$ CRYSTALS DURING THE DECOMPOSITION OF CAUSTIC SODA SOLUTIONS

- P.S.A.6. A.S. Nikolić¹, J.M. Puzović², P. Osmokrović³, T.J. Sabo¹, M.S. Stojanović¹, M.B. Pavlović⁴
¹Faculty of Chemistry, Belgrade, ²Faculty of Physics, Belgrade, ³Faculty of Electrical Engineering, Belgrade, ⁴Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro
 PREPARING OF STRONTIUM-FERITE FROM COMPLEX COMPOUNDS WITH ACETYLACETONATO LIGANDS
- P.S.A.7. A.S. Nikolić¹, V. Likar-Smiljanić², Č. Jovalekić³, T. Čajkovski⁴, R. Biljić², D. Manojlović¹, M.B. Pavlović⁴
¹Faculty of Chemistry, Belgrade, ²Faculty of Electrical Engineering, Belgrade, ³Center for Multidisciplinary Studies, Belgrade, ⁴Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro
 NICOLSON-ROSS ANALYSIS OF ABSORPTION COEFFICIENTS OF NICKEL AND NICKEL-ZINC FERRITE POWDERS PREPARED BY DIFFERENT METHODS
- P.S.A.8. Z.P. Nedić¹, U.B. Mioč¹, M. Todorović², D. Arandelović³, M. Odović¹
¹Faculty of Physical Chemistry, Belgrade, ²Faculty of Chemistry, Belgrade, ³Institute of General and Physical Chemistry, Belgrade, Serbia and Montenegro
 THERMAL AND CONDUCTIVE INVESTIGATIONS OF ALKALINE EARTH SALTS OF 12-TUNGSTOPHOSPHORIC ACID
- P.S.A.9. S. Uskoković-Marković¹, Ph. Colomban², U.B. Mioč³, M.R. Todorović⁴
¹Faculty of Pharmacy, Belgrade, ²Laboratoire de Dynamique Interaction et Reactivité, CNRS, Thiais, France, ³Faculty of Physical Chemistry, Belgrade, ⁴Faculty of Chemistry, Belgrade, Serbia and Montenegro
 RAMAN AND INFRARED SPECTROSCOPY OF EARTH ALKALINE SALTS OF 12-TUNGSTOPHOSPHORIC ACID
- P.S.A.10. S. Marković¹, V. Pejović², M. Mitrić³, N. Cvjetičanin⁴, M. Miljković⁵, D. Uskoković¹
¹Institute of Technical Sciences of SASA, Belgrade, ²d.d. IRITEL, Belgrade, ³Vinča Institute of Nuclear Science, Belgrade, ⁴Faculty of Physical Chemistry, Belgrade, ⁵Laboratory for Electron Microscopy, Niš, Serbia and Montenegro
 SCREEN PRINTED BaTi_{1-x}Sn_xO₃ FUNCTIONALLY GRADIENT MATERIALS: PREPARATION AND PROPERTIES
- P.S.A.11. V. M. Vukotić, T. V. Srećković, Z. V. Marinković
 Center for Multidisciplinary Studies, University of Belgrade, Belgrade, Serbia and Montenegro
 MECHANICAL SYNTHESIS OF CaTiO₃ FROM CaCO₃ - TiO₂ MIXTURE
- P.S.A.12. S. Petrović¹, Lj. Karanović², M. Zdujić³, P. Kirilov-Stefanov⁴, A. Terlečki-Baričević¹

¹ICHTM-Department of Catalysis and Chemical Engineering, Belgrade, ²Laboratory of Crystallography, Faculty of Mining and Geology, Belgrade, ³Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro, ⁴Institute of General and Inorganic Chemistry, BAN, Sofia, Bulgaria
 MECHANOCHEMICAL ACTIVATION IN SYNTHESIS OF $\text{LaTi}_{0.5}\text{Mg}_{0.5-x}\text{Pd}_x\text{O}_3$ ($0 < x < 0.1$) PEROVSKITE

P.S.A.13. T. Srećković¹, N. Obradović², N. Labus², Z. Marinković¹, M. M. Ristić³
¹Center for Multidisciplinary Studies, University of Belgrade, Belgrade, ² Institute of Technical Sciences of SASA, Belgrade, ³ Serbian Academy of Sciences and Arts, Belgrade, Serbia and Montenegro
 ENHANCING SYNTHESIS AND SINTERING OF ZINC TITANATE USING MECHANICAL ACTIVATION

P.S.A.14. D. Živanović
 Institute for Mineral and Nuclear Technologies, Belgrade, Serbia and Montenegro
 SINTERING OF MECHANOCHEMICAL ACTIVATED HIDRATED ALUMOSILICATE

P.S.A.15. S. Loreti¹, A. Santoni¹, J. Lancok², I. Menicucci¹, C. Minarini³, D. Della Sala⁴
¹ENEA-Frascati, Frascati Italy, ² Academy of Science, Institute of Physics, Prague, Czech Republic, ³ ENEA-Portici, Portici, Italy, ⁴ ENEA-Casaccia, S. Maria di Galeria, Italy
 METAL-INDUCED CRYSTALLIZATION OF POLYCRYSTALLINE SILICON BY IN-SITU EXCIMER LASER ANNEALING DURING LOW- PRESSURE CVD GROWTH

P.S.A.16. B. Šljukić, N. Vukelić, S. Mentus
 Faculty of Physical Chemistry, Belgrade University, Belgrade, Serbia and Montenegro
 WATER ELECTROLYSIS ON PLATINUM CATALYSED CARBON POWDERS

P.S.A.17. M.G. Pavlović¹, K.I. Popov², L.J.J. Pavlović¹, E.R. Ivanović³
¹ICTM-Department of Electrochemistry, Belgrade, ²Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, ³Faculty of Agriculture, University of Belgrade, Zemun, Serbia and Montenegro
 THE EFFECTS OF RC ON THE PROPERTIES OF COPPER POWDER PARTICLES AND PROPERTIES OF ELECTROLYTIC COPPER POWDER, I. THE MORPHOLOGY OF PARTICLES

P.S.A.18. K.I. Popov¹, M.G. Pavlović², L.J.J. Pavlović², V.M. Maksimović³, E.R. Ivanović⁴
¹Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, ²ICTM-Department of Electrochemistry, Belgrade, ³Vinča Institute of Nuclear Sciences,

Belgrade, ⁴Faculty of Agriculture, University of Belgrade, Zemun, Serbia and Montenegro

THE EFFECTS OF RC ON THE PROPERTIES OF COPPER POWDER PARTICLES AND PROPERTIES OF ELECTROLYTIC COPPER POWDER, II. THE APPARENT DENSITY AND FLOWABILITY OF POWDER

P.S.A.19. M. Spasojević¹, A. Maričić², L. Rafailović¹, B. Jordović²
¹Faculty of Agronomy, Čačak, University of Kragujevac, ²Technical Faculty, Čačak, University of Kragujevac, Serbia and Montenegro

THE EFFECT OF THE ELECTROLYSIS PARAMETERS ON THE OBTAINED COBALT AND NICKEL POWDER PROPERTIES

P.S.A.20. A. Maričić, V. Milovanović, R. Simeunović, B. Jordović

Technical Faculty, Čačak, Serbia and Montenegro

KINETICS OF HYDROGEN ABSORPTION AND HYDROGEN DESORPTION OF THE POWDER Ni_{55.5}Co_{44.5}

P.S.A.21. A. Maričić¹, M. Spasojević², V. Milovanović¹, L. Rafailović²

¹Technical Faculty, Čačak, University of Kragujevac, ²Faculty of Agronomy, Čačak, University of Kragujevac, Serbia and Montenegro

HYDROGEN ABSORPTION AND DESORPTION KINETICS IN NICKEL AND COBALT ALLOY POWDER

P.S.A.22. A. Maričić¹, M. Spasojević², D. Minić³, L. Ribić-Zelenović²

¹Technical Faculty, Čačak, University of Kragujevac, ²Faculty of Agronomy, Čačak, University of Kragujevac, ³Faculty of Physical Chemistry, Belgrade, University of Belgrade, Serbia and Montenegro

CHARACTERISTICS OF ELECTROCHEMICALLY OBTAINED AMORPHOUS IRON AND TUNGSTEN POWDERS

P.S.A.23. D. Mikičić¹, A. Kunosić¹, M. Zlatanović¹, Ž. Đurišić¹, Z. Karastojković²

¹Faculty of Electrical Engineering, Belgrade, ²Polytechnic Academy, New Belgrade, Serbia and Montenegro

MICROABRASION METHOD FOR THICKNESS DETERMINATION OF PLASMA NITRIDED LAYER

P.S.A.24. N. Popović¹, Ž. Bogdanov¹, B. Gončić¹, S. Zec¹, M. Zlatanović², D. Peruško¹

¹Vinča Institute of Nuclear Sciences, Belgrade, ²Faculty of Electrical Engineering, Belgrade, Serbia and Montenegro

IN SITU OPTICAL MEASUREMENT OF TiN THIN FILM GROWTH AND CORRELATION WITH RBS ANALYSIS

- P.S.A.25. V. Zarubica, V. Skerović, P. Vukadin, A. Nikolić
Bureau of Measures and Precious Metals, Belgrade, Serbia and Montenegro
METHOD FOR DETERMINING NONHOMOGENEOUS OF OPTICAL TRANSMITTANCE MATERIALS
- P.S.A.26. B. Zlatičanin¹, B. Radonjić¹, Z. Marinković²
¹*University of Montenegro, Faculty of Metallurgy and Technology, Podgorica, ²CMS – Belgrade, University of Belgrade, Belgrade, Serbia and Montenegro*
DSC INVESTIGATION OF HIGH-COPPER AlCuMg ALLOYS
- P.S.A.27. B. Zlatičanin¹, B. Radonjić¹, Z. Marinković², S. Đurić³, B. Jordović⁴
¹*University of Montenegro, Faculty of Metallurgy and Technology, Podgorica, ²CMS – Belgrade, Belgrade, ³Faculty of Mining and Geology, Belgrade, ⁴Faculty of Technical Sciences, Čačak, Serbia and Montenegro*
CHARACTERIZATION OF MICROSTRUCTURE AND PROPERTIES OF AlCuMg ALLOYS
- P.S.A.28. B. Bošnjak¹, B. Radulović¹, B. Verlinden²
¹*Faculty of Metallurgy and Technology, University of Montenegro, Serbia and Montenegro, ²Catholic University of Leuven, Belgium*
WEAR RESISTANCE OF LOW ALLOYED AUSTEMPERED DUCTILE IRON
- P.S.A.29. S. Dević¹, V. Jokanović², M. Logar³
¹*Institute for Metallurgy, Smederevo, ²Institute of Technical Sciences of SASA, Belgrade, ³Faculty of Mining and Geology, Belgrade, Serbia and Montenegro*
THE DEPENDANCE OF THE SEN INTERNAL EROSION AND THE CONCENTRATION OF Al, Si AND Ca IN THE SEN WALL ON THE CONTINUOUS STEEL CASTING
- P.S.A.30. B. Jović¹, T. Petrović², Č. Lačnjevac³, Lj. Gajić-Krstajić⁴
¹*CMS, University of Belgrade, ²Zorka-boje, Šabac, ³IMS Institute, Belgrade, ⁴Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro*
THE INFLUENCE OF THE COMPOSITION CHANGE OF ORGANIC SPREADING COATINGS ON THEIR PROPERTIES
- P.S.A.31. S. J. Veličković¹, I. G. Popović¹, J. Jovanović², B. Adnađević³
¹*Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, ²Institute of Technical Sciences of SASA, Belgrade, ³Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro*
MICROWAVE ASSISTED POLYMERIZATION OF DIMETHYL ITACONATE
- P.S.A.32. P. Miletić¹, S. Jovanović², V. Bojanić³, M. G. Pavlović⁴, Z. Topić³, M. Dragić⁵
¹*Forestry Faculty, Banjaluka, ²Faculty of Technology and Metallurgy, Belgrade*

³Faculty of Agriculture, Banjaluka, ⁴ICMT-Department of Electrochemistry, Belgrade, Serbia and Montenegro, ⁵MUP RS, Department for Crimetechnics, Banjaluka, Serbian Republic, Bosnia and Herzegovina
SYNTHESIS OF THE 4-VINILPYRIDINE COPOLYMERS WITH STIREN, METYLACRILAT AND METHYLMETHACRYLAT, AND THEIR APPLY FOR THE ADSORPTION OF GOLD

P.S.A.33. B. Čubrić¹, I. Pajić-Lijaković¹, R.S. Popović², B. Bugarski¹, M.B. Plavšić¹
¹Faculty of Technology and Metallurgy, Belgrade, ²Technical Experimental Centre, Belgrade, Serbia and Montenegro
INFLUENCE OF DIFFERENT FILLERS ON MECHANICAL PROPERTIES OF NR / SBR ELASTOMER COMPOSITES

P.S.A.34. M.B. Plavšić¹, I. Pajić-Lijaković¹, B. Čubrić¹, R.S. Popović², B. Bugarski¹
¹Faculty of Technology and Metallurgy, Belgrade, ²Technical Experimental Centre, Belgrade, Serbia and Montenegro
CHAIN CONFORMATIONAL STATISTIC AND MECHANICAL PROPERTIES OF ELASTOMER COMPOSITES

P.S.A.35. N.L. Lazić¹, M.B. Plavšić²
¹Institute of General and Physical Chemistry, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro
REINFORCEMENT OF SBR 1500 RUBBER BY SILICA FILLER

P.S.A.36. R. Ž. Radičević, J. K. Budinski-Simendić
University of Novi Sad, Faculty of Technology, Novi Sad, Serbia and Montenegro
THE EFFECTS OF ALKYD/MELAMINE RESIN RATIO AND CURING TEMPERATURE ON THE PROPERTIES OF THE COATINGS

P.S.A.37. Č. Lačnjevac¹, D. Chawla², B. Jović³, Lj. Gajić-Krstajić⁴
¹IMS Institute, ²Zorka-boje, Šabac, ³CMS, University of Belgrade, ⁴Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro
THE PROPERTIES OF POLYURETHANE SPREADING COATINGS DEPENDING ON THE COMBINATION OF ISOCYANATES AND POLYOLS

P.S.A.38. T. Trišović¹, Lj. Gajić-Krstajić¹, N. Krstajić²
¹Institute of Technical Sciences of SASA, Belgrade, ²Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia and Montenegro
THE ELECTROLYTIC HYDROGENATION OF GLUCOSE

P.S.A.39. S. Grubišić¹, N. S. Drašković², M. I. Đuran², V. Đinović³, D. D. Radanović¹
¹Institute of Chemistry, Technology and Metallurgy, Belgrade, ²Department of Chemistry, University of Kragujevac, Kragujevac, ³Faculty of Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro

NEW SIMPLE SYNTHETIC METHOD AND CRYSTAL STRUCTURES OF
COBALT(II)-PDTA COMPLEXES

P.S.A.40. M. P. Antić¹, V. V. Antić², M. N. Govedarica²

¹Faculty of Agriculture, Zemun, ²Center of Chemistry, Institute of Chemistry,
Technology and Metallurgy, Belgrade, Serbia and Montenegro

THE SYNTHESIS OF α,ω -DICARBOXYPROPYL
POLY(DIMETHYLSILOXANE)S FROM DIMETHYLDICHLOROSILANE
HYDROLYSATE

P.S.A.41. Z. B. Leka¹, T. J. Sabo², Ž. Lj. Tešić², S. R. Lukić³, S. J. Skuban³, S. R. Trifunović⁴

¹Faculty of Metallurgy and Technology, Podgorica, ²Faculty of Chemistry, University
of Belgrade, Belgrade, ³Institute of Physics, Faculty of Sciences, Novi Sad,

⁴Department of Chemistry, Faculty of Sciences, University of Kragujevac,
Kragujevac, Serbia and Montenegro

THE COMPLEXES OF ZINC(II), CADMIUM(II), PLATINUM(II) AND
PALLADIUM(II) WITH POTASSIUM-3-DITHIOCARBOXY-3-AZA-5-
AMINOPENTANOATE

P.S.A.42. D. Zlatanović

Faculty of Sciences, University of Priština, K. Mitrovica, Serbia and Montenegro

DEPOSITION OF ORGANIC THIN FILMS IN GLOW DISCHARGE

POSTER SESSION II

Wednesday, September 17, 2003, 20³⁰-22⁰⁰

SYMPOSIUM B: ADVANCED MATERIALS FOR HIGH-TECHNOLOGY APPLICATIONS

P.S.B.1. M. Messina^{1,2}, F. Cleri¹, G. Mazzone¹
¹ENEA, Unità Materiali e Nuove Tecnologie, Centro Ricerche Casaccia, CP 2400, Roma A.D., Italy, ²Università "La Sapienza", Dipartimento di Fisica, Roma, Italy
 ab-initio MODELLING OF INTERSTITIAL Mg:H SOLID SOLUTIONS

P.S.B.2. A.N.Khodan, J.-P. Contour, D. Michel
Institute of Physical Chemistry RAS, Moscow, Russia; UMR-0137 C.N.R.S./THALES, Orsay, France, C.E.C.M. C.N.R.S. Vitry-sur-Seine, France
 APPLICATION OF ZrO₂ - CeO₂ - La₂O₃ FILMS IN MULTILAYERED OXIDE HETERO STRUCTURES

P.S.B.3. I. Krakovsky, V. Myroshnychenko
Department of Macromolecular Physics, Faculty of Mathematics and Physics, Charles University, Praha, Czech Republic
 EFFECTIVE MACROSCOPIC PROPERTIES OF HETEROGENEOUS MATERIALS MODELLED BY FINITE-ELEMENT METHOD

P.S.B.4. Z. V. Popović, A. Milutinović, N. Tomić, S. Dević
Center for Solid State Physics and New Materials, Institute of Physics, Belgrade/Zemun, Serbia and Montenegro
 FIR AND RAMAN SPECTROSCOPY OF POLYCRYSTALLINE α -MnSe

P.S.B.5. M. V. Nikolić¹, M. M. Ristić²
¹Center for Multidisciplinary Studies of the University of Belgrade, Belgrade, ²Serbian Academy of Sciences and Arts, Belgrade, Serbia and Montenegro
 A PHENOMENOLOGICAL ANALYSIS OF SINTERING KINETICS OF ALUMINA

P.S.B.6. Z. V. Marinković¹, L. Mančić², P. Vulić³, O. Milošević²
¹Center for Multidisciplinary Studies, University of Belgrade, Belgrade, ²Institute of Technical Sciences of SASA, Belgrade, ³Faculty of Mining and Geology, Department of Crystallography, Belgrade, Serbia and Montenegro
 THE INFLUENCE OF MECHANICAL ACTIVATION ON THE STOICHIOMETRY AND DEFECT STRUCTURE IN THE SINTERED ZnO-Cr₂O₃ SYSTEM

P.S.B.7. Z. M. Nikolić¹, V. B. Pavlović², M. M. Ristić³

¹Faculty of Physics, University of Belgrade, Belgrade, ²Faculty of Agriculture, University of Belgrade, Zemun, ³Serbian Academy of Sciences and Arts, Belgrade, Serbia and Montenegro

DPR ANALYSIS OF MICROSTRUCTURAL EVOLUTION OF ZnO CERAMICS

P.S.B.8. I.Bošković¹, S. Mentus², M. Pješčić¹

¹Faculty of Metallurgy and Technology, Podgorica, ²Faculty of Physical Chemistry, Belgrade University, Belgrade, Serbia and Montenegro

HALOGENIDE OXIDATION ON PLATINUM CATALYSED Ti₄O₇

P.S.B.9. Lj. Pavlović, M. Lazić

Institute for Technology of Nuclear and Other Mineral Raw Materials, Belgrade, Serbia and Montenegro

SINTERING KINETICS OF PZT CERAMICS DOPED WITH NIOBIUM

P.S.B.10. S. Marković¹, V. Dondur², R. Dimitrijević³

¹Institute of Technical Science of SASA, Belgrade, ²Faculty of Physical Chemistry, Belgrade, ³Faculty of Mining and Geology, Department of Crystallography, Belgrade, Serbia and Montenegro

INVESTIGATION OF RINGS EVOLUTION IN ALUMINOSILICATE STRUCTURES: THE COMPARISON OF EXPERIMENTAL AND CALCULATED VIBRATIONAL SPECTRA

P.S.B.11. V. Rakić¹, V. Dondur², S. Gajinov³, A. Auroux⁴

¹Faculty of Agriculture, Zemun, ²Faculty of Physical Chemistry, Belgrade, ³Institute of General and Physical Chemistry, Belgrade, Serbia and Montenegro, ⁴Institut de Recherches sur la Catalyse, Villeurbanne, France

THE OXIDATION STATE OF COPPER ION IN THE ZSM-5 ZEOLITE

P.S.B.12. Z. Mojović¹, S. Mentus¹, N. Cvjetičanin¹, Ž. Tešić²

¹Faculty of Physical Chemistry, Belgrade University, Belgrade, ²Faculty of Chemistry, Belgrade University, Belgrade, Serbia and Montenegro

INTRODUCTION OF Pt AND Pd NANOCCLUSERS IN ZEOLITE CAVITIES BY THERMAL DEGRADATION OF ACETYLACETONATES

P.S.B.13. D. Popović¹, S. Spasović¹, J. Dojčilović¹, N. Kulagin²

¹Faculty of Physics, University of Belgrade, Belgrade, Serbia and Montenegro, ²Kharkov National University for Radioelectronics, Kharkov, Ukraine

LOW TEMPERATURE SPECTROSCOPIC AND DIELECTRICAL PROPERTIES OF PEROVSKITE CRYSTALS DOPED BY d - OR f - IONS

P.S.B.14. J. Đorđević¹, Lj. Damjanović¹, V. Dondur¹, S. Macura²

¹Faculty of Physical Chemistry, Belgrade, Serbia and Montenegro, ²Department of Biochemistry, Mayo Foundation, Rochester, Minnesota, USA

SHORT RANGE ORDERING IN Ba- AND Sr-CELSIAN PHASES

- P.S.B.15. V. Dondur¹, R. Dimitrijević¹, Lj. Damjanović¹, S. Macura³
¹Faculty of Physical Chemistry, Belgrade, ²Faculty of Mining and Geology, Belgrade, Serbia and Montenegro, ³Department of Biochemistry, Mayo Foundation, Rochester, USA
MAS NMR AND INFRARED SPECTROSCOPIC STUDY OF Al-Si ORDERING IN MAGNESIUM CORDIERITE PHASES
- P.S.B.16. Lj. Živković¹, V. Paunović¹, Lj. Vračar¹, M. Miljković²
¹Faculty of Electronic Engineering, Niš, ²Laboratory for Electron Microscopy, University of Niš, Serbia and Montenegro
SEM STUDY OF FERROELECTRIC DOMAINS IN MODIFIED BaTiO₃ CERAMICS
- P.S.B.17. B. Radojčić¹, R. Ramović², O. Aleksić¹
¹Institute of Security, Belgrade, ²Faculty of Electrical Engineering, Belgrade, Serbia and Montenegro
ANALYSIS OF THERMAL DISTRIBUTION IN MODULES WITH Al₂O₃ AND EPOXY SUBSTRATES
- P.S.B.18. R. Hercigonja¹, V. Dondur¹, V. Rakić³, R. Dimitrijević², S. Marković⁴
¹Faculty of Physical Chemistry, Belgrade, ²Faculty of Mining and Geology, Belgrade, ³Faculty of Agriculture, Belgrade, ⁴Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro
MID-INFRARED SPECTROSCOPY INVESTIGATION OF STUFFED DERIVATIVES OF CRISTOBALITE PRODUCED FROM ZEOLITES WITH DIFFERENT EXTRAFRAMEWORK CATIONS
- P.S.B.19. T. Vasiljević¹, M. Bačić¹, M. Laušević¹, A. Onjia²
¹Faculty of Technology and Metallurgy, Belgrade, ²Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro
SURFACE COMPOSITION AND ADSORPTION PROPERTIES OF ACTIVATED CARBON CLOTH
- P.S.B.20. D. Mikičić¹, A. Kunosić¹, M. Zlatanović¹, Ž. Đurišić¹, Z. Karastojković²
¹Faculty of Electrical Engineering, Belgrade, ²Polytechnic Academy, New Belgrade, Serbia and Montenegro
MICROABRASION METHOD FOR THICKNESS DETERMINATION OF PLASMA NITRIDED LAYER
- P.S.B.21. D. Živković¹, D. Manasijević¹, A. Kostov²
¹University of Belgrade, Technical Faculty, Bor, ²Copper Institute, Bor, Serbia and Montenegro
THERMODYNAMIC STUDY OF Ga-BASED LIQUID BINARY SYSTEMS SHOWING INTERFACIAL PHASE TRANSITIONS

- P.S.B.22. D. Stojanović¹, N. Romčević¹, D.R. Khokhlov², M. Romčević¹, A. V. Nikorich³
¹*Institute of Physics, Belgrade, Serbia and Montenegro*, ²*Physics Department, Moscow State University, Moscow, Russia*, ³*Applied Physics Institute of the Moldavian Academy of Science, Kishenev, Moldavia*
 RAMAN INVESTIGATION OF DX-LIKE CENTERS IN INDIUM DOPED Pb_{1-x}Sn_xTe(In)
- P.S.B.23. D. Čevizović¹, R. Šašić², R. Ramović¹
¹*Faculty of Electrical Engineering, Belgrade*, ²*Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro*
 TEMPERATURE AFFECT TO AlGaAs/GaAs HETEROJUNCTION PROPERTIES
- P.S.B.24. S. Bikić¹, I. Gazdić², M. Tais³, S. Sulejmanović⁴, N. Bajrović⁴, T. Mihač⁴
¹*Faculty for Materials and Metallurgy, Zenica*, ²*Educational and Pedagogical Institute, Tuzla*, ³*Federal Meteorological Bureau, Sarajevo*, ⁴*Faculty of Sciences, Dept. of Physics, Sarajevo, Bosnia and Herzegovina*
 THE INVESTIGATION OF MAGNETIC SUSCEPTIBILITY IN AMORPHOUS Fe_{43,2}Ni_{23,2}Co_{13,6}B₂₀ SYSTEM
- P.S.B.25. A. Kapidžić, M.D. Dramićanin
Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro
 2nd HARMONIC THERMAL WAVES IN A MATERIALS CHARACTERIZATION
- P.S.B.26. J. Trajić¹, V.N. Nikiforov², N. Romčević¹, M. Romčević¹, A.N. Vasil'ev²
¹*Institute of Physics, Belgrade, Serbia and Montenegro*, ²*Department of Low-Temperature Physics, Moscow State University, Moscow, Russia*
 OFF CENTERS IN PbTe_{0.95}S_{0.05} SINGLE CRISTAL: ULTASONIC STUDY
- P.S.B.27. A. Nastasović¹, S. Jovanović², D. Jakovljević¹, A. Onjia³, S. Stanković²
¹*IChTM-Center for Chemistry, Belgrade*, ²*Faculty of Technology and Metallurgy, Belgrade*, ³*Vinča Institute of Nuclear Sciences, Chemical Dynamics Laboratory, Belgrade, Serbia and Montenegro*
 NOBLE METALS BINDING ON THE MACROPOROUS POLY(GMA-CO-EGDMA) MODIFIED WITH ETHYLENEDIAMINE
- P.S.B.28. Z. Kačarević-Popović, N. Tjapkin, M. Šiljegović, I. Draganić
Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro
 MODIFICATION OF ETHYLENE-NORBORNEN COPOLYMER BY IRRADIATION WITH N⁴⁺ ION BEAMS
- P.S.B.29. D. Babić, Z. Kačarević-Popović, M. Marinović-Cincović
Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro
 STRUCTURAL CHANGES IN HIGHLY CROSSLINKED POLYETHYLENE-POLYPROPYLENE BLENDS AS MEASURED BY DSC METHOD

- P.S.B.30. V. Laninović¹, K. Jeremić²
¹IMS Institute, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro
MORPHOLOGY OF POLYETHERSULFONE FLAT SHEET MEMBRANES
- P.S.B.31. A.B. Nastasović¹, A. Onjia², S.K. Milonjić², S.M. Jovanović³
¹Institute for Chemistry, Technology and Metallurgy, Center for Chemistry, Belgrade, ²Vinča Institute of Nuclear Sciences, Chemical Dynamics Laboratory, Belgrade, ³Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro
GLASS TRANSITION TEMPERATURE DETERMINATION OF MACROPOROUS COPOLYMER BY INVERSE GAS CHROMATOGRAPHY
- P.S.B.32. S. Nikolić¹, V. Radojević², A. Valčić², A. Golubović¹
¹Institute of Physics, Zemun, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro
OBTAINING CRITICAL RATE OF PLANE-TO-CELLULAR INTERFACE TRANSITION
- P.S.B.33. J. Stajić-Trošić, V. Čosović, N. Talijan
Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia and Montenegro
CRYSTALLIZATION BEHAVIOR OF Nd-Fe-B BASED ALLOYS AFTER HEAT TREATMENT
- P.S.B.34. O. Novitović¹, M. Rebernik², A. S. Nikolić³
¹Technical College, Užice, Serbia and Montenegro, ²Atotech, Podnart, Radovljica, Slovenia, ³Faculty of Chemistry, Belgrade, Serbia and Montenegro
THE INFLUENCE OF SMALL DEFORMATIONS ON THE EFFECT OF THERMAL AGEING OF THE ALLOY AILi 8091
- P.S.B.35. M. D. Obradović¹, B. N. Grgur², Lj. M. Vračar²
¹ICTM – Department of Electrochemistry, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro
APPARENT ENTHALPIES OF ACTIVATION OF OXYGEN REDUCTION AT Pt₃Co ELECTRODE IN ALKALINE SOLUTIONS
- P.S.B.36. S. Stanković¹, B. Grgur², N. Krstajić², M. Vojnović²
¹Department of Analytical Chemistry, ²Department of Physical Chemistry and Electrochemistry, Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia and Montenegro
THE ZINC CORROSION IN NEAR NEUTRAL EDTA SOLUTIONS

- P.S.B.37. M. Vratnica¹, Z. Cvijović², M. Rakin²
¹*Faculty of Metallurgy and Technology, Podgorica,* ²*Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro*
FRACTURE TOUGHNESS MODELLING IN HIGH-STRENGTH Al-BASED ALLOYS
- P.S.B.38. L. Matija¹, J. Simić-Krstić², Đ. Koruga³
¹*Institute of Technical Sciences of SASA, Belgrade,* ²*IHIS Institute, Zemun-Belgrade,* ³*Faculty of Mechanical Engineering University of Belgrade, Belgrade, Serbia and Montenegro*
PRETZEL: A NEW TYPE OF FULLERENES
- P.S.B.39. A. Đorđević¹, M. Vojinović-Miloradov¹, A. Kapor¹, D. Lazar¹, D. Petrović², M. Hegediš
¹*University of Novi Sad, Faculty of Natural Sciences and Mathematics, Novi Sad,* ²*University of Novi Sad, Technical Faculty, Novi Sad, Serbia and Montenegro*
INTERCALATED DERIVATIVES C₆₀ WITH UNORGANIC SALT
- P.S.B.40. B. Todorović-Marković¹, Z. Marković¹, I. Mohai², Z. Karoly², L. Gal², J. Szepvolgyi²
¹*"Vinča" Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro,* ²*Chemical Research Center, Hungarian Academy of Sciences, Budapest, Hungary*
OPTICAL DIAGNOSTICS OF CARBON ARC AND INDUCTION PLASMAS IN FULLERENE PROCESSING
- P.S.B.41. T. Jovanović¹, Đj. Koruga², B. Jovančičević¹, J. Simić-Krstić³
¹*Department of Applied Chemistry, Chemical Faculty of Belgrade University, Belgrade,* ²*Molecular Machine Research Center, Mechanical Engineering Faculty of Belgrade University, Belgrade,* ³*Fullerenes Science and Technology Center, Chemical Power Sources Institute, Belgrade-Zemun, Serbia and Montenegro*
OPTIMIZATION OF EXTRACTION AND CHROMATOGRAPHIC SEPARATION OF FULLERENES C₆₀ AND C₇₀
- P.S.B.42. N. Popović¹, I. Koruga², J. Jovanović³, J. Simić-Krstić¹
¹*Institute of Chemical Power Sources (IHIS), Zemun,* ²*Department of Physics, University of Arizona, Tucson, USA,* ³*Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro*
INVESTIGATION OF OPTICAL PROPERTIES OF NANOSCALE FULLERENE FILMS

- P.S.B.43. A. Nikolić, V. Zarubica, V. Skerović
Bureau of Measures and Precious Metals, Belgrade, Serbia and Montenegro
SPECTROPHOTOMETRY CHARACTERIZATION FULLERENE THIN FILMS
- P.S.B.44. Ivana D. Smičiklas, Antonije E. Onjia
Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro
INVERSE GAS CHROMATOGRAPHY STUDY OF SYNTHETIC
HYDROXYAPATITE SURFACE BY HEXANE ADSORPTION AT FINITE
SURFACE COVERAGE

POSTER SESSION III

Thursday, September 18, 2003, 20³⁰-22⁰⁰

SYMPOSIUM C: NANOSTRUCTURED MATERIALS

- P.S.C.1. G. A. Battiston¹, D. Berto¹, A. Convertino^{1,2}, D. Emiliani¹, R. Gerbasì¹, S. Viticoli²
¹*Istituto di Chimica Inorganica e delle Superfici del C.N.R., Padova, Italy,* ²*Istituto per lo Studio dei Materiali Nanostrutturati del C.N.R., Monterotondo St. (Roma), Italy*
 PECVD OF h-BN AND c-BN FILMS FROM BORANEDIMETHYLAMINE AS A SINGLE SOURCE PRECURSOR
- P.S.C.2. D. Hourlier-Bahloul¹, B. Doucey¹, L. Čerović², S. Milonjić²
¹*UMR CNRS 6638, SPCTS, Limoges, Cedex, France,* ²*Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro*
 HIGH-TEMPERATURE BEHAVIOR OF SILICON CARBONITRIDE NANOPOWDERS USED AS STARTING MATERIALS OF ADVANCED CERAMIC NANOCOMPOSITES Si₃N₄/SiC
- P.S.C.3. R. Krsmanović¹, S. Polizzi¹, P. Canton¹, A. Speghini², M. Bettinelli²
¹*Dipartimento di Chimica Fisica, Laboratorio di Microscopia Elettronica, Università Ca' Foscari di Venezia, Venice, Italy,* ²*Dipartimento Scientifico e Tecnologico, Università di Verona, Verona, Italy*
 CHARACTERIZATION OF NANOPOROUS LANTHANIDES-DOPED YAG POWDERS OBTAINED BY PROPELLANT SYNTHESIS
- P.S.C.4. E. D. Tabachnikova¹, V.Z. Bengus¹, V.D. Natsik¹, R.Z. Valiev², D.V. Gundarev², I. V. Alexandrov²
¹*Institute for Low Temperature Physics and Engineering of NASU, Kharkov, Ukraine,* ²*Institute of Physics of Advanced Materials, USATU, Ufa, Russia*
 LOW TEMPERATURE DEFORMATION OF NANOSTRUCTURED Cu AND Ti
- P.S.C.5. Lj. Nikolić¹, V. Srdić¹, M. Bokorov²
¹*Department. of Materials Engineering, Faculty of Technology,* ²*Department of Biology and Ecology, Faculty of Natural Sciences, University of Novi Sad, Serbia and Montenegro*
 SOL-GEL TITANIA COATINGS AS GAS SENSORS
- P.S.C.6. M. S. Lazić¹, V. B. Mišković-Stanković², Đ. T. Janačković², R. Petrović², Lj. M. Pavlović¹

¹Institute of Nuclear and Other Mineral Raw Materials, Belgrade, ²Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia and Montenegro

THE ELECTROPHORETIC DEPOSITION OF BOEHMITE SOL ON THE TITANIUM

- P.S.C.7. S. Petrović, B. Gaković, Z. Rakočević, T. Nenadović
Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro
THE EFFECT OF VARIOUS PARAMETERS ON STRUCTURE OF W-Ti THIN FILMS
- P.S.C.8. B. Babić Stojić, D. Milivojević, M. Čomor
Vinča Institute of Nuclear Sciences, Belgrad, Serbia and Montenegro
EPR STUDY OF MANGANESE IN Cd_{1-x}Mn_xS QUANTUM DOTS
- P.S.C.9. Z. D. Dohčević-Mitrović, M. J. Šćepanović, I. I. Hinić, G. M. Stanišić
Institute of Physics, Belgrade, Serbia and Montenegro
LASER INDUCED SYNTHESIS OF ULTRAFINE TiO₂ POWDERS
- P.S.C.10. S.K. Jačimovski ¹, J.P. Šetrajčić ¹, B.S. Tošić ¹, V.D. Sajfert ²
¹Department of Physics, Faculty of Sciences, University of Novi Sad, ²Technical Faculty "M. Pupin", Zrenjanin, University of Novi Sad, Serbia and Montenegro
PHONON THERMODYNAMICS OF SUPERLATTICES
- P.S.C.11. A. Montone¹, M. Vittori Antisari¹, J. Grbović², E. Bonetti³, L. Pasquini³, A. Bassetti³, A. Fiorini³
¹Materials and Technology Unit, ENEA C.R. Casaccia, Roma, Italy, ²Institute of Nuclear Sciences "Vinča", Department of Material Science, Belgrade, Serbia and Montenegro, ³Department of Physics, University of Bologna and INFN, Italy
MICROSTRUCTURAL CHARACTERIZATION OF Mg-C NANOCOMPOSITES

SYMPOSIUM D: COMPOSITES

- P.S.D.1. A. Ishmaku, K. Han
National High Magnetic Laboratory, Florida State University, Tallahassee, Florida, USA
CHARACTERIZATION OF COLD-ROLLED CU-NB COMPOSITE
- P.S.D.2. F. Thiebaud¹, P. Robinet¹, R. Aleksić², P.S. Uskoković², D. Perreux¹
¹Laboratoire de Mécanique Appliquée R. Chaleat, Besançon, France, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro
THE BEHAVIOR OF $\pm 55^\circ$ FILAMENT-WOUND GLASS-FIBER/EPOXY-RESIN TUBES UNDER COMBINED TENSILE AND INTERNAL PRESSURE LOADING
- P.S.D.3. D. Bučevac, S. Bošković
Institute of Nuclear Sciences Vinča, Materials Science Laboratory 170, Belgrade, Serbia and Montenegro
HOT PRESSING OF $\text{Si}_3\text{N}_4/\text{Si}_3\text{N}_4$ COMPOSITES
- P.S.D.4. A. Devečerski¹, J. Grbović¹, Z. Laušević¹, N. Petranović²
¹Institute of Nuclear Sciences Vinča, Belgrade, ²Faculty of Physical Chemistry, Belgrade, Serbia and Montenegro
INCREASED STABILITY OF C/C-COMPOSITE TOWARD CATALYTIC OXIDATION
- P.S.D.5. A. Vučković, S. Bošković
Materials Science Laboratory, Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro
SYNTHESIS OF SELF-REINFORCED Si_3N_4 BASED COMPOSITES WITH CeO_2
- P.S.D.6. J. Jakšić, Lj. Vračar, N. Krstajić
Faculty of Technology and Metallurgy, University of Belgrade, Serbia and Montenegro
UNDERPOTENTIAL TEMPERATURE-DEPENDENCE DEPOSITION OF HYDROGEN ON Pt_3Mo ALLOY IN ACID SOLUTION
- P.S.D.7. J. Kuljanin, M.I. Čomor, J.M. Nedeljković
Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro
STUDY OF THERMAL STABILITY OF COMPOSITES PS/ SEMICONDUCTOR PARTICLES
- P.S.D.8. V. Radojević¹, D. Nedeljković², N. Talijan², R. Aleksić¹

¹Faculty of Technology and Metallurgy, Belgrade, ²Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia and Montenegro
MAGNETIC FIELD SENSING BY OPTICAL FIBERS WITH COMPOSITE COATING

- P.S.D.9. Ž. Gnjidić, A. Devečerski, O. Erić, V. Rajković, D. Božić
Institute of Nuclear Sciences "Vinča", Material Sciences Laboratory, Belgrade, Serbia and Montenegro
THE EFFECTS OF STRUCTURE CHARACTERISTICS ON MECHANICAL PROPERTIES OF ALUMINUM ALLOY MATRIX COMPOSITES
- P.S.D.10. G. Marković¹, B. Radovanović², M. Marinović-Cincović³, J. Budinski-Simendić⁴
¹Rubber Products Enterprise "Tigar", Pirot, ²Faculty of Science, Niš, ³Institute of Nuclear Sciences Vinča, Belgrade, ⁴Faculty of Technology, Novi Sad, Serbia and Montenegro
THE INFLUENCE OF NANO AND MICRO SILICA ON THERMAL STABILITY OF ELASTOMERES BASED ON CR, NBR AND CSM RUBBERS
- P.S.D.11. S. Samardžija Jovanović¹, V. Jovanović¹, G. Marković²
¹Department of Chemistry, Faculty of Science, University of Priština, Kosovska Mitrovica, ²Rubber Products Enterprise "Tigar", Pirot, Serbia and Montenegro
ACTIVATION ENERGY OF CROSSLINKING AND DEGRADATION PROCEESS OF ETHYLENE-PROPILENE-DIENE RUBBER CROSS-LINKING SYSTEMS DETERMINED BY RHEOMETER
- P.S.D.12. M. Purenović, M. Miljković, A. Zarubica
Faculty of Mathematics and Natural Sciences, Niš, Serbia and Montenegro
THE ANTI-CORROSIVE CHARACTERIZATION OF STEEL PROTECTED USING THE ACTIVE-PASSIVE METHOD

SYMPOSIUM E: BIOMATERIALS

- P.S.E.1. M. Natić, D. Sladić, Ž. Tešić, K. Anđelković
Faculty of Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro
ANTIMICROBIAL AND ANTITUMOR ACTIVITY OF USNIC ACID
HYDRAZONES AND THEIR Cu(II) AND Pd(II) COMPLEXES
- P.S.E.2. K. Anđelković, N. Filipović, D. Jeremić, D. Sladić
Faculty of Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro
SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF BIS
HYDRAZONE OF OXALOHYDRAZIDE AND 2-ACETILPYRIDINE AND ITS
Zn(II) COMPLEX
- P.S.E.3. V. Radulović¹, K. Anđelković², D. Minić³
¹*Institute of Chemistry, Technology and Metallurgy, Department of Chemistry, Belgrade,* ²*Faculty of Chemistry, University of Belgrade, Belgrade,* ³*Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro*
INVESTIGATION OF THERMAL BEHAVIOUR OF TRANSITION METAL
COMPLEXES WITH HYDRAZONE AND HYDRAZIDE DERIVATIVES OF 2,6-
DIACETILPYRIDINE
- P.S.E.4. V. S. Jevtović¹, V. M. Leovac¹, S. Markov², J. Simeunović³
¹*Department of Chemistry, Faculty of Sciences, Novi Sad,* ²*Faculty of Technology, Novi Sad,* ³*Department of Biology, Faculty of Sciences, Novi Sad, Serbia and Montenegro*
SYNTHESIS, PHYSICOCHEMICAL AND ANTIBACTERIAL
CHARACTERISTICS OF Cu(II) COMPLEXES WITH PYRIDOXAL
SEMICARBAZONE
- P.S.E.5. S. Grubišić¹, M. Gruden-Pavlović², S. R. Niketić²
¹*Institute of Chemistry, Technology and Metallurgy, Belgrade,* ²*Faculty of Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro*
CONFORMATIONAL ANALYSIS OF OCTA- AND TETRAHALOGENATED
TETRAPHENYLPORPHYRINS AND THEIR METAL DERIVATIVES
- P.S.E.6. D. Đorđević, M. Novaković, D. Trajković
Faculty of Technology, Leskovac, Serbia and Montenegro
BIOPROCESSING OF POLYESTER FIBERS
- P.S.E.7. D. Pepić, M. S. Nikolić, J. Đonlagić
Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro
BIODEGRADABLE ALIPHATIC POLYESTERS WITH HYDROPHILIC SOFT
SEGMENTS
- P.S.E.8. J. Jovanović¹, B. Adnađević², M. Kićanović³, N. Ignjatović¹, D. Uskoković¹

¹Institute of Technical Sciences of SASA, Belgrade, ²Faculty of Physical Chemistry, Belgrade, ³Institute of General and Physical Chemistry, Belgrade, Serbia and Montenegro

INVESTIGATION OF THE INFLUENCE OF THE HYDROPHOBING OF HAp ON THE CROSSLINKING OF PDMS/HAp COMPOSITES

- P.S.E.9. S.Lj. Tomić¹, M.T. Kalagasidis Krušić¹, E.S. Džunuzović², J.M. Filipović¹
¹Faculty of Technology and Metallurgy, Belgrade University, ²Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro
 SYNTHESIS AND CHARACTERIZATION OF POLY(ITA CONIC ACID) AND POLY(ETHYLENE GLYCOL) COMPLEXES
- P.S.E.10. M. Kalagasidis Krušić¹, S. Tomić¹, E. Džunuzović², J. Filipović¹
¹Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, ²Institute of Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro
 SWELLING KINETICS OF ACRYLAMIDE - ITA CONIC ACID COPOLYMER HYDROGELS
- P.S.E.11. V.D. Živanović¹, M.B. Tošić¹, S.R. Grujić², J.D. Nikolić¹
¹Institute for Technology of Nuclear and Other Mineral Raw Materials, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro
 CRYSTALLIZATION MECHANISM OF CaO-P₂O₅-V₂O₅ GLASS
- P.S.E.12. M.B. Tošić¹, V.D. Živanović¹, N.S. Blagojević², J.D. Nikolić¹
¹Institute for Technology of Nuclear and Other Mineral Raw Materials, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro
 CRYSTALLIZATION KINETICS OF INVERT PHOSPHATE GLASS
- P.S.E.13. B.R. Jovanić¹, M. Dramićanin², L.B. Davidović³
¹Institute of Physics, Center of Experimental Physics, Zemun, ²Institute of Nuclear Sciences "Vinča," Laboratory for Radiation Chemistry and Physics, Belgrade, ³Institute for Cardiovascular Diseases, UCC, Belgrade, Serbia and Montenegro
 OPTICAL REFLECTANCE AND THE FINGERTIP
- P.S.E.14. R.S. Nikolić, B. Kalićanin, G.M. Nikolić
 Department of Chemistry, Faculty of Sciences, Niš, Serbia and Montenegro
 CHEMICAL STABILITY INVESTIGATION OF DENTAL PROSTHETIC MATERIALS IN ORAL FLUID AND WEAKLY ACIDIC SOLUTIONS
- P.S.E.15. M. B. Plavšić¹, M. M. Plavšić¹, P. Putanov²
¹Faculty of Technology and Metallurgy, Belgrade, ²Serbian Academy of Sciences and Arts, Belgrade, Serbia and Montenegro

POLARITY OF POLYMER BIOMATERIALS AND CATALYTIC ASPECTS OF
In vivo DEGRADATION

P.S.E.16. L. Nikčević¹, D. Maravić², N. Ignjatović¹, N. Paunović³, N. Romčević³, D. Uskoković¹

¹*Institute of Technical Sciences of SASA, Belgrade,* ²*Faculty of Physical Chemistry, University of Belgrade, Belgrade,* ³*Institute of Physics, Belgrade, Serbia and Montenegro*

FTIR STUDY OF THE INFLUENCE OF MECHANOCHEMICAL TREATMENT
ON HYDROXYAPATITE/POLY-L-LACTIDE AND
HYDROXYAPATITE/POLY-L-LACTIDE/COLLAGEN COMPOSITES

P.S.E.17. D. Stojanović¹, R. Petrović², I. Janković-Častvan², S. Sajić², V. Mišković-Stanković², Dj. Janačković², D. Uskoković³

¹*Medical Center Vračar, Belgrade,* ²*Faculty of Technology and Metallurgy, Belgrade,* ³*Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro*
ELECTROPHORETIC DEPOSITION OF CALCIUM-HYDROXYAPATITE ON
TITANIUM SUBSTRATE

P.S.E.18. K. Simović¹, I. Tutunović¹, D. Kičević¹, P. Jovanić²

¹*Institute of Nuclear Sciences Vinča, Materials Science Laboratory, Belgrade,* ²*Institute of Nuclear and Other Mineral Raw Materials, Belgrade, Serbia and Montenegro*

ELECTROPHORETIC DEPOSITION OF HYDROXYAPATITE FROM WATER
SUSPENSIONS ON STEEL

P.S.E.19. D. Marković¹, V. Živojinović¹, V. Koković², V. Jokanović³

¹*Clinique for Children and Preventive Stomatology, Faculty of Stomatology, University of Belgrade,* ²*Military Medical Academy, Belgrade,* ³*Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro*
PULP REACTION OF DECIDUOUS TEETH ON BIOMATERIALS

P.S.E.20. D. Marković¹, V. Živojinović¹, V. Koković², V. Jokanović³

¹*Clinique for Children and Preventive Stomatology, Faculty of Stomatology, University of Belgrade,* ²*Military Medical Academy, Belgrade,* ³*Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro*
BIOMATERIALS AS ROOT CANAL FILLINGS

Abstracts

Oral Presentation

PL.S.A.I.I.

TOWARDS SiGe TERAHERTZ VCSELS

R. W. Kelsall¹, Z. Ikonić¹, P. Harrison¹, D. J. Paul², S. A. Lynch², R. Bates², D. J. Norris³, S.L. Liew³, A. G. Cullis³, D. D. Arnone⁴, C. R. Pidgeon⁵, P. Murzyn⁵, D. J. Robbins⁶, R. A. Soref⁷
¹School of Electronic and Electrical Engineering, University of Leeds, Leeds, U.K., ²University of Cambridge, Cavendish Laboratory, Cambridge, U.K., ³Department of Electronic and Electrical Engineering, University of Sheffield, Sheffield, U.K., ⁴TeraView Ltd, Cambridge, U.K., ⁵Department of Physics, Heriot-Watt University, Riccarton, Edinburgh, , U.K., ⁶Qinetiq, Malvern, U.K., ⁷Sensors Directorate, AFRL/SNHC, Hanscom AFB, U.S.A.

The authors constitute a multiple-University/industrial effort within the U.K. to develop a vertical cavity surface emitting Terahertz laser in the Si_{1-x}Ge_x/Si material system. Such an aim is extremely challenging because of the complexity of this lattice mismatched material system and the requirement for the use of intra-valence band transitions in order to produce light with in-plane (xy) polarisation. Achieving high gain in a cascade structure relies on stacking many active regions together, however in a lattice mismatched system the the limit of the critical thickness needs to be circumvented. This is achieved by growing a linearly graded buffer on top of the Si substrate in order to produce a 'virtual substrate', the optically thick quantum well stack is then grown as a strain-balanced structure by low pressure CVD.

The presence of more than one type of carrier (light- and heavy-holes) means that traditional approaches to active region design, tried and tested in the III-V *n*-type devices, can no longer be applied. Detailed theoretical calculations of band structure and carrier dynamics (including hole-phonon and hole-hole scattering), supported by far-infrared pump-probe spectroscopy at the Dutch free-electron laser (FELIX) have lead to two possible active region configurations and Terahertz electroluminescence has been observed in both edge emitting (z polarisation) and surface normal geometries. The nanoWatt electroluminescent powers are considerably higher than those obtained in the early stages of development of the III-V Terahertz emitters, and have recently lead to the growth of 100 active region repeats embedded within Terahertz optical cavities—the first prototype laser structures.

PL.S.A.I.2.

PREDICTION OF FUTURE PROFILE UNDER PLASMA CHARGING IN SiO₂ ETCHING

T. Makabe, T. Yagisawa, T. Shimada, Z.Lj. Petrović
Keio University, Yokohama, Japan

A prediction of future profile will be discussed in the SiO₂ etching, achieved by a high energy ion impact in fluorocarbon plasma. In the next generation multi-layer interconnect system, the trench bottom exposed to a high energy ion irradiation and the lower level device elements will be influenced by a local charging damage during etching. We show the interesting and essential phenomena by using VicAddress (vertically integrated computer aided design for device process) developed in Keio.

The charging damage in 2D is discussed in terms of the ion energy distribution, corresponding to a two-frequency capacitively coupled plasma at several tens mTorr and several mTorr range, respectively.

PL.S.A.I.3.

SORPTION MECHANISMS AND SORPTION MODELS

M. Fedoroff¹, G. Lefevre¹, M. Duc¹, S. Milonjić², C. Nešković¹

¹Centre d'Etudes de Chimie Métallurgique, C. N. R. S., Vitry, France, ²Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

Sorption-desorption phenomena control the migration of toxic and radioactive elements in surface and underground water in contact with solid matter. They play also an important role in separation technology and in catalysts. A good knowledge of sorption processes and their modelization is needed for a quantitative prediction of sorption properties and their applications. Several sorption models are concurrently used such as ion exchange and surface complexation models, which can be divided in monosite and multisite models with different descriptions of electrostatic potentials (CCM, DLM, TLM, ..). We have performed a systematic comparison of sorption mechanisms and models on solids such as phosphates, oxyhydroxides and hexacyanoferrates. Through a multidisciplinary approach, including many microscopic and spectroscopic methods, we showed that the real sorption processes are very numerous and, often, do not correspond to simple and usual models. As examples, sorption on hydroxyapatites may proceed, depending on the element, by substitution of superficial species of the solid or by precipitation. On hexacyanoferrates, we can observe a true ion exchange or the formation of new solid phases. On metal oxyhydroxides, the process corresponds to surface complexation, but several different models of that kind can fit experimental data. This results in poorly defined superficial site density and thermodynamic constants. Slow kinetics, solubility of the solid, evolution of the solid with time, can also make the phenomena more complex. Progress in the understanding of sorption processes could be achieved and will be increased in the future by using materials of high purity, with controlled crystal structure and morphology.

O.S.A.I.1.

**ELECTROPHORETIC DEPOSITION OF THIN SOFC-ELECTROLYTE FILMS ON
POROUS $\text{La}_{0.75}\text{Sr}_{0.2}\text{MnO}_{3-\delta}$ CATHODES**

Chr. Argiris, T. Damjanović, G. Borchardt

TU Clausthal, Institut für Metallurgie, D-38678 Clausthal-Zellerfeld, Germany

Solid oxide fuel cells with an electrode supported thin film electrolyte (electrolyte thickness $5\text{ }\mu\text{m} < d < 20\text{ }\mu\text{m}$) are due to decreased electrolyte resistance a promising alternative to electrolyte supported single cells.

The electrophoretic deposition (EPD) was performed from two different suspensions: $\text{ZrO}_2/10\text{ }\%$ Y_2O_3 (YSZ) and $\text{La}_{0.9}\text{Sr}_{0.1}\text{Ga}_{0.8}\text{Mg}_{0.2}\text{O}_{3-\delta}$ (LSGM). The thickness of deposits was controlled by varying the conditions of the electrophoretic deposition.

O.S.A.I.2.

**SOL-GEL ROUTE FOR ELECTROPHORETIC DEPOSITION OF MULLITE
DIFFUSION BARRIERS ON C/C-Si-SiC-COMPOSITES**

T. Damjanović¹, H. Leipner², Chr. Argiris¹, R. Herbig², R. Weiß³, G. Tomandl², G. Borchardt¹

¹TU Clausthal, Institut für Metallurgie, Clausthal-Zellerfeld, Germany

²TU Bergakademie Freiberg, Institut für Keramische Werkstoffe, Freiberg, Germany

³Schunk Kohlenstofftechnik GmbH, Gießen, Germany

Electrophoretic deposition (EPD) is, in contrast to dip coating, a suitable technique to produce mullite layers for acceptable oxidation protection of C/C-Si-SiC-composites. Combining sol-gel synthesis of $3\text{Al}_2\text{O}_3:2\text{SiO}_2$ mullite through hydrolysis and condensation of Tetraethoxysilane (TEOS) and Aluminumtri-sec-butylate ($\text{Al}(\text{OBu})_3$) with EPD yields sufficiently thick and homogeneous layers which transform into mullite at $1300\text{ }^\circ\text{C}$. Reproducible mullite oxidation barriers were obtained.

O.S.A.I.3.

MODELING OF ELECTROPHORETIC DEPOSITION OF OXIDES ON C/C-Si-SiC-COMPOSITES

B. Jokanović¹, T. Damjanović¹, R. Weiß², G. Borchardt¹

¹ TU Clausthal, Institut für Metallurgie, Clausthal-Zellerfeld, Germany

² Schunk Kohlenstofftechnik GmbH, Gießen, Germany

Electrophoretic deposition is a versatile coating technique for poorly conducting materials on sufficiently well conducting substrates, e.g. oxides are deposited on highly conductive carbon composites covered by a moderately conductive SiC layer. A numerical simulation based on the solution of the Laplace equation is applied to different geometries. The calculations yield potential distributions and current densities which are directly connected with the oxide mass deposited on the samples. The calculated results are compared with experimentally obtained values and satisfactory agreement is found. Further, the model reproduces the main features of the current-voltage relation.

O.S.A.I.4.

STRUCTURE PREDICTION OF SOLIDS: HEURISTIC ALGORITHMS FOR LOCAL OPTIMIZATION ON HARTREE-FOCK LEVEL

Ž. P. Čančarević¹, J. Ch. Schön¹, M. Jansen¹

¹ Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany

In recent years, experiments at very high pressures exceeding 10 GPa have become more and more common. This has led to an enormous increase in the number of new high-pressure phases discovered in various chemical systems. It would be of great advantage in the identification of newly generated phases, if one could supplement the experimental results by theoretical investigations on the same system.

The prediction of high pressure phases of a chemical system is realized a two-step process: identification of structure candidates through the global exploration of the energy landscapes over a range of different pressures, followed by a local optimization of the candidates on *ab-initio* level. From the computed $E(V)$ -curves, one could then calculate the stable phase at a given pressure and the transition pressures among the phases.

In this work we perform a study of high-pressure modifications of alkali metal sulfides M_2S ($M = Li, Na, K, Rb, Cs$). We present a heuristic algorithm for the local optimization of the cell parameters and the relative atom positions on Hartree-Fock-level, and show at the example of, how this leads to a significant improvement in the agreement between computed and measured transition pressures.

O.S.A.I.5.

**THE MICROSTRUCTURE OF BARIUM BISMUTH TANTALATE THIN FILMS
OBTAINED BY POLYMERIC PRECURSOR METHOD**

B.D. Stojanović^{1,2}, G.C.C. Costa², A.Z. Simões², M. Cilense², J.A. Varela²

¹Center for Multidisciplinary Studies UB, Belgrade, Serbia and Montenegro

²Instituto de Química-UNESP, Araraquara, Brasil

In recent years, ferroelectric thin films have attracted much attention for use in nonvolatile applications. The crystal structure of BaBi₂Ta₂O₉ (BBT), so-called Aurivillius compounds, consists of Bi₂O₂ layers and perovskite-type BaTa₂O₇ units with double TaO₆ octahedral layers. Thin films of BBT were deposited on silicate and Pt/Ti/SiO₂ (111) substrates by spin-coating from the polymeric precursors (Pechini process). The polymeric precursors method, among other chemical methods, is well-known in the area of processing thin films for a number of virtues: easier composition control, better homogeneity, low processing temperature (compatible with Si processing), easier fabrication of large area thin films, and low cost. The obtained films were characterized by optical microscopy, X-ray diffraction and atomic force microscopy. The influence of viscosity on the morphology of BBT thin films, of temperature on crystallization, morphology and properties of BBT are discussed. Surface roughness and crystallization of these films are strongly dependent on the annealing conditions.

O.S.A.I.6

**PHASE EVOLUTION OF Si₃N₄ CERAMIC WITH ADDITIVES FROM THE Li₂O-
Y₂O₃**

B. Matović¹, G. Rixecker², F. Aldinger², S. Bošković¹

¹Institute of Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro,

²Max-Planck-Institute, Stuttgart, Germany

This paper deals with the α - to β -Si₃N₄ phase transformation during pressureless sintering of Si₃N₄ with LiYO₂ as sintering additive. The phase evolution after heat treatments in the temperature range of 1200° to 1500°C shows that the main crystalline phases are α -Si₃N₄ and β -Si₃N₄ for all stages of annealing. At 1200°C the initial LiYO₂ sintering additive has completely disappeared. X-ray patterns show remarkable broadening of the diffraction lines in the regions around 27-29° and 32-34° 2 θ which can be associated with the phase Y₅(SiO₄)₃N ("N-apatite"). This indicates that nucleation and formation of crystalline N-apatite takes place at this temperature, which is the onset of liquid formation. At 1600°C the secondary phase has been completely converted into a liquid phase and total conversion of α - to β -Si₃N₄ has taken place.

PL.S.A.II.1.

RAMAN / RAYLEIGH STUDY OF NANOPHASES

Ph. Colomban

LADIR-UMR 7075, CNRS & Université P. & M. Curie, Thiais, France

Unique properties (conductivity, diffusion, reactivity, sintering, mechanical strength....) have been reported for nanostructured materials, all of which result from the interfacial characteristics. Raman scattering is a unique tool for the characterization of such materials, providing information on the chemical bond arrangement and short-range order in amorphous, nanocrystalline or nanosized phases. This paper gives an overview of the information extracted from Raman spectra in nanomaterials chosen among coloured nanophases (pigments, carbon-containing materials), electrolytes films (ZrO_2 , CeO_2), electrode films (Li-intercalated InVO_4) and fibres. The possibility of *in situ* analysis of working solid-state devices (under mechanical stress or electrochemical cycling) will be discussed.

O.S.A.II.1.

DECREASE OF THE BaTiO₃ FORMATION TEMPERATURE

D. Đurović¹, V. Pejović², S. Bošković¹

¹Institute of Nuclear Sciences "Vinča", Belgrade,

²D.D. IRITEL, Belgrade, Serbia and Montenegro

Mixture of BaCO₃ and TiO₂, mechanically activated by intense grinding in a laboratory vibrating mill for up to 120 min, was additionally heat treated from 650°C to 900°C. Non-activated, as well as activated mixtures were characterized by observing the particle morphology under a scanning electron microscope and by detecting the present phases using high temperature X-ray diffraction analysis. Differential thermal analysis (DTA) was used to obtain thermal histories of non-activated, as well as activated mixtures. The obtained results indicate that the temperature of the BaTiO₃ formation process for the activated mixtures is lower than the one for non-activated mixture. Beneficial influence of mechanical activation on the reaction mixture is mainly consequence of the change of granulometry during the intense milling. The constant breakage of particles causes exposition of fresh, highly energetic surfaces, thus enhancing chemical reaction at lower temperature.

O.S.A.II.2

INFLUENCE OF MECHANICAL ACTIVATION ON SINTERING KINETICS CaTiO₃

V. Petrović¹, M.M. Ristić²

¹Electrotechnical Colledge, Belgrade,

²Serbian Academy of Sciences and Arts, Belgrade Serbia and Montenegro

Ceramic materials have been in use in many different areas of human well-being for a very long time. Important domains in ceramic materials are those materials that are applied in electronics. Our research is focused on calcium-titanate (CaTiO₃). Most common way of obtaining this material is by using the process of sintering. During mechanical activation inorganic materials are grinded when grain size is being reduced. Crystal structure submits distortion and also change, what is leading in some systems to chemical reaction and formation of new compound. In this work we are explaining mechanical activation influence on sintering kinetics in system CaCO₃-TiO₂. We noticed temperature drop and time reduction needed for CaTiO₃ sintering when duration of mechanical activation is longer.

O.S.A.II.3.

THE THERMAL STABILITY OF MECHANICALLY ALLOYED COPPER WITH 3 AND 4WT.% Al_2O_3

V. Rajković¹, O. Erić¹, D. Božić¹, M. Mitkov¹, E. Romhanji²

¹Institute of Nuclear Sciences "Vinča", Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

The copper matrix has been dispersion strengthened with commercial alumina particles (3 and 4wt. %) by mechanical alloying. The mechanical alloying process has been performed in planetary ball mill up to 20h. Depending of milling time and alumina content, microhardness of mechanically alloyed compacts are up to 4 times higher then that of pure copper compacted under identical condition. According to obtained results, the mechanically alloyed copper is not characterized by thermal stability. After high temperature exposure this material is not capable to retain a relatively high hardness.

O.S.A.II.4.

DATA BASES FOR MODELING PLASMA DEVICES FOR PROCESSING OF INTEGRATED CIRCUITS

Z. Lj. Petrović¹, G. Malović¹, Ž. Nikitović¹, A. Strinić¹, S. Dujko¹, Z. Raspopović¹, M. Radmilović-Radenović¹, O. Šašić²

¹Institute of Physics, Zemun, ²Faculty of Transport and Traffic Engineering, University of Belgrade, Belgrade, Serbia and Montenegro

Together with photolithography plasmas are used for critical steps in production of integrated circuits. Achieving very high resolutions in sub 100 nm ranges requires removal of charging and other sources of defects. For that purpose detailed modeling of plasmas is required for computer aided design and real time control of plasma devices. Key data entering such models are electron-molecule cross-sections and transport coefficients. In this paper we show data for rare gases and for some molecular gases of interest for plasma etching such as methane and CF_4 . Cross section sets were compiled and tested against the swarm data and transport coefficients were calculated and measured for dc and rf fields. We also indicate the range of conditions where fast neutrals make significant contribution to excitation and dissociation kinetics.

O.S.A.II.5.

PLASMA OXIDATION OF SALT BATH NITRIDED STEEL SAMPLES

M. Zlatanović¹, N. Popović², Ž. Bogdanov², S. Zec²

¹Faculty of Electrical Engineering, Belgrade,

²Institute of Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro

Quenched and tempered samples made of plain carbon and hot work steel were salt bath nitrided at 590°C for 210 minutes and subsequently oil quenched. The nitrided samples were half cut to obtain an untreated surface that was polished before further processing. Both salt bath nitrocarburized and untreated surfaces were subjected to oxygen containing gas mixture glow discharge in the same bath. The plasma pulse power supply generated 16,6 kHz pulses with 0,95% duty cycle at the temperature of 480°C and pressure of 400 Pa for 60 minutes. The thickness of compound surface layer was measured by calotest method, while the optical microscopy and SEM analyses were used for investigation of modified surface zone structure and morphology. The phase composition of obtained surface structure was analyzed by XRD. It was found that the salt bath treatment produced the ϵ single-phase layer on hot work steel sample, while in the same batch the γ' zone was formed on the plain carbon steel specimen. The oxide layer phase formed depends on the substrate chemical composition and the surface pretreatment applied.

O.S.A.II.6.

MODIFICATION OF CARBON CLOTH BY INTERACTION WITH PULSED CO₂ LASER

B. Kaluderović¹, M. Trtica¹, M. Srećković², B. Babić¹

¹Institute of Nuclear Sciences "Vinča", Belgrade

²Faculty of Electrical Engineering, Belgrade, Serbia and Montenegro

The interaction of a Transversely Excited Atmospheric (TEA) CO₂ laser, pulse duration less than 2 μ s, with carbon cloth with different specific surface area was investigated. The investigations have shown that carbon cloth had been chemically and physically modified by TEA CO₂ laser. The type of modification strongly depends on energy density of the laser pulse. The morphology transformations induced by interaction with TEA CO₂ laser pulses were quite different in the relation on the effects induced by interaction with some other lasers: ruby or Nd³⁺:YAG.

O.S.A.II.7.

AN ANALYSIS OF HOT DEFORMATION OF AN Al-Cu-Mg ALLOY PRODUCED BY POWDER METALLURGY

F. Bardi¹, M. Cabibbo¹, E. Evangelista¹, S. Spigarelli¹, M. Vukčević², K. Delijić²

¹INFM/Department of Mechanics, University of Ancona, Ancona, Italy, ²Faculty of Metallurgy and Technology, Podgorica, Serbia and Montenegro

The high-temperature plasticity of a 2014 aluminium alloy produced by powder metallurgy was investigated in a wide range of temperatures and strain rates. When the strain rate was plotted as a function of stress (either peak flow stress in torsion, or applied stress in tensile creep), the alloy exhibited the same threshold-like behaviour observed in similar materials. The microstructure of representative torsioned samples was analyzed in a transmission electron microscope (TEM) and the characteristics of particles and precipitate distribution were estimated. The dependence on stress and temperature was analyzed by means of the conventional constitutive equations used for describing the hot-working behaviour and by means of a modified form of the sinh-equation, where the stress was substituted by an effective stress i.e. by the difference between the actual stress and a threshold stress. This temperature-dependent threshold stress was found to be a constant fraction (15%) of the Orowan stress generated by the dispersion of alumina particles and of precipitated intermetallic phases.

O.S.A.II.8.

MAGNETIC FIELD INTENSITY MEASUREMENTS OF C₆₀ THIN FILMS UNDER DIFFERENT LIGHT INFLUENCES

A. Nikolić¹, Lj. Petrov¹, Đ. Koruga¹, S. Mihajlović²

¹Faculty of Mechanical Engineering, Belgrade,

²Geomagnetic Institute, Grocka, Serbia and Montenegro

In this paper a review of probe of transformation C₆₀ thin films magnetic field intensity under daily and lamp lights is presented. Transformation of magnetic field for two different layer thickness fullerenes thin film is retraced. For these measurements fluxgate magnetometer and protonic magnetometer are used. The measurements were done in Geomagnetic Institute, Grocka. Both samples of 30 nm and 250 nm illustrate good measuring characteristic. Change of magnetic field intensity is about 40 nT for five measuring minutes on fluxgate, and 45 measuring minutes on protonic magnetometer.

O.S.A.II.9.

Na-ALUMINATE SOLUTION AS A PRECURSOR FOR SOL-GEL SYNTHESIS OF THE ALUMINA POWDERS

V. Mujičić¹, V. Jokanović², Lj. Kostić-Gvozdenović³, N. Blagojević³, M. Krgović⁴, Đ. Janačković³

¹Aluminium Plant Podgorica, Podgorica, ²Institute of Technical Sciences of SASA, Belgrade,

³Faculty of Technology and Metallurgy, Belgrade, ⁴Faculty of Metallurgy and Technology, Podgorica, Serbia and Montenegro

Industrial hydrometallurgical processes are not so common sources of precursors for production of nanostructured high-purity powders. Huge volumes of Na-aluminate solutions, which circulate through the alumina plants, can be used as a source for production of high-quality nanoscale alumina powders. Supersaturated Na-aluminate solution from KAP's Alumina Plant was chosen as a reactant to synthesize boehmite powder with low sodium content. The influence of neutralisation parameters (final pH of the reaction, concentration of the initial Na-aluminate solution and reaction temperature), on the amount of incorporated sodium in solid phase, was established. This solid phase was a subject of further hydrothermal treatment at 180°C. The properties of such obtained sol-gel were submitted through the set of different characterisations.

O.S.A.II.10.

ELECTRICAL PROPERTIES OF EXCHANGED MONTMORILLONITE CLAYS

S. Sređić¹, T. Čajkovski², M. Davidović^{2,3}, D. Čajkovski², V. Likar-Smiljanić³, R. Biljić⁴, U. B. Mioč⁵, M. Marinović-Cincović²

¹Institute of Mining, Prijedor, Bosnia and Herzegovina (Serbian Republic), ²Vinča Institute of Nuclear Sciences, Belgrade, ³Faculty of Electrical Engineering, University of Belgrade, Belgrade, ⁴VTA Žarkovo, Belgrade, ⁵Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro

Natural raw material bentonite from deposits "Šipovo" (Bosnia and Herzegovina) which contains a high percentage of montmorillonite clay was treated by the following procedure. Firstly, purification was made by sieving and sedimentation. The second step was ionic-exchange and Na⁺ exchanged clay was obtained. The third procedure was so called pillaring, where Na⁺ cations are exchanged with Al-oxyhydroxy cations. By calcination Al-oxyhydroxy cations transform into Al oxide, which are now acting as pillars, permanently separating silicate layers. During this process protons are generated and they contribute to an increase of conductivity. Electrical conductivity was measured using the method of impedance spectroscopy in the frequency range 5 Hz - 500 kHz. Conductivity activation energy as well as dielectric losses were studied. There is a strong influence of relative humidity on conductivity.

PL.S.B.I.I.

IMPURITY LEVELS IN DOPED WIDE-GAP II-VI BULK SEMIMAGNETIC SEMICONDUCTORS

Le Van Khoi

Institute of Physics, Polish Academy of Sciences, Warsaw, Poland

Recent progress in *p-type* doping of II-VI wide-gap semimagnetic semiconductors using a nitrogen plasma source led to the discovery of the hole-induced ferromagnetism in modulation doped $\text{Cd}_{1-x}\text{Mn}_x\text{Te:N}$ quantum wells and molecular beam epitaxy grown layers of $\text{Zn}_{1-x}\text{Mn}_x\text{Te:N}$. More recently, our investigations concerning the doping of II-VI bulk semimagnetic semiconductors (SMS) have demonstrated that annealing of $\text{Zn}_{1-x}\text{Mn}_x\text{Te}$ bulk crystals doped with phosphorus (P) under a high nitrogen pressure allows to obtain hole concentrations as high as $5 \times 10^{18} \text{ cm}^{-3}$ for $x=0.05$ at $T=300 \text{ K}$ and the annealed samples exhibit clear indication of the ferromagnetic correlation at temperatures $T \leq 2.3 \text{ K}$. The hole concentration in our $\text{Zn}_{1-x}\text{Mn}_x\text{Te}$ bulk crystals is close to the Mott critical concentration $N_C \approx 1 \times 10^{19} \text{ cm}^{-3}$. However, further increase of the hole concentration in this particular material as well as in other II-VI SMS remains still a considerable technological challenge due to the compensation phenomenon that takes place in doped II-VI semiconductors. Before this problem can be solved successfully, it is necessary to have a clear picture of the energy levels of intentional impurities relative to the band structure of the host material as well as the energy level variation with Mn content.

In this communication, we review our recent work concerning doping of $\text{Zn}_{1-x}\text{Mn}_x\text{Te}$ and $\text{Cd}_{1-x}\text{Mn}_x\text{Te}$ crystals with phosphorus. We focus on following important issues: (i) the growth of $\text{Zn}_{1-x}\text{Mn}_x\text{Te}$ and $\text{Cd}_{1-x}\text{Mn}_x\text{Te}$ crystals doped with P by high pressure Brigman technique, and the post-growth high-pressure nitrogen annealing procedure, which suppresses the compensation in the as-grown crystals and leading to the increase of the hole concentration, (ii) the determination of the ground state binding energy of P impurity in these materials by measuring the Hall effect, photoluminescence, and reflectance. We also demonstrate, for the first time, that the intra- Mn^{2+} emission in $\text{Zn}_{1-x}\text{Mn}_x\text{Te}$ could be quenched by doping $\text{Zn}_{1-x}\text{Mn}_x\text{Te}$ with P. As a result, the room-temperature pure green PL ($\lambda_{\text{max}}=538 \text{ nm}$) was observed in $\text{Zn}_{0.93}\text{Mn}_{0.07}\text{Te}$. Finally, we report on the preparation of light emitting diodes using grain boundaries in low resistance $\text{Zn}_{1-x}\text{Mn}_x\text{Te}$ crystals.

PL.S.B.I.2.

NEW MATERIALS FOR FUEL CELL REACTIONS

V. Stamenković, B. Blizanac, B. Grgur, M. Arenz, P. Ross, N. M. Marković

Materials Sciences Division, Lawrence Berkeley National Laboratory, University of California,
Berkeley, USA

The need to understand the key structure/composition relationships governing the electrocatalytic behavior of metal surfaces, continues to motivate fundamental studies of surface processes at the solid-liquid interfaces. To this end, systematic variation of surface crystallography and/or surface composition has been employed to delineate very important electrocatalytic trends. In this work, ex-situ ultra high vacuum (UHV) and in-situ surface x-ray scattering (SXS) and Fourier transform infrared (FTIR) studies in conjunction with the rotating ring disk electrode (RRDE) method is used to establish a link between the macroscopic kinetic rates of fuel cell reactions and microscopic occupancy of intermediates and spectator adsorbates on fuel cell catalysts. Although the field is still in its infancy, a great deal has already been learned and trends are beginning to emerge that give new insight into the true relationship between the surface structure/composition and electrocatalytic activity.

In order to give a brief overview of the field, this presentation will focus on the role of bifunctional, ligand and ensemble effects in electrocatalysis of the hydrogen reaction (HR), the electrooxidation of H_2/CO mixtures and the oxygen reduction reaction (ORR). As a background for discussion, the structure sensitive adsorption of hydrogen, oxygenated species, and anions on Pt, Cu, Ag and Au single crystal surfaces in aqueous solutions will be presented. The results show that the kinetics of the HR and the ORR vary with the surface structure, emphasizing that if special sites are needed for adsorption then special sites are also needed for reaction. Hopping that the combination of different metals would have superior catalytic activity and/or stability relative to the pure metal, the kinetics of fuel cell reactions have also been studied on bimetallic surfaces. By focusing on the mechanism of action of the HER/HOR and the oxidation of CO on Pt-bimetallic surfaces it will be shown that the ability to make a controlled and well-characterized arrangement of two elements in electrode surface and even near the surface region presages a new era of advances in our knowledge of the electrocatalysis. Platinum electrode modified with a thin Pd films, with a thickness ranging from zero to five atomic monolayers, are used to demonstrate how the energetics of intermediates formed in the hydrogen reaction is affected by interfacial bonding and energetic constraints produced between pseudomorphic Pd films and the Pt(111) substrate. On the other hand, the kinetics of oxidation of CO and H_2/CO mixtures on Pt and Pt-Sn bimetallic single crystal surfaces is used to demonstrate that the optimization of an electrocatalyst for specific inorganic reaction must accommodate many contributing factors, some understood, some not, and it is a complex task. It is even more complicated to understand how a reaction proceeds when pure gases are mixed, as in the case for the oxidation of H_2/CO mixtures on Pt(hkl) and Pt-bimetallic surfaces. Finally, a carefully balanced selection of results describing the relation between the kinetic rates of the ORR and a surface composition of bimetallic alloy surfaces are used to analyze the differences in the kinetics of the ORR on Pt-Ni, Pt-Co, Pt-Pd and Au-Pd surfaces.

PL.S.B.I.3.

**NEW METHOD OF POROUS OXIDE SYNTHESIS: ALUMINA AND ALUMINA
BASED COMPOUNDS**

J.-L. Vignes¹, D. Michel¹, T. di Costanzo¹, C. Frappart¹, A.N. Khodan²

¹C.E.C.M. C.N.R.S. Vitry-sur-Seine, France

²Institute of Physical Chemistry RAS, Moscow, Russia

Novelty of the synthesis method based on a using of very low density ($\sim 0,02 \text{ g/cm}^3$) alumina hydroxides obtained by active oxidation of aluminum in a humid atmosphere. Porous monoliths consisting of nanofibrils can be obtained with a volume up to several liters. Thermal treatment of monoliths between 1000 and 1700°C allows to sinter porous aluminas with the density varies between 0.04 and 3 g/cm³ and with specific area up to 90 m²/g consisting of submicronic θ - or micronic α - alumina crystallites. Due to very high porosity, these materials can have different applications: high temperature filters, substrate for the catalysts and nuclear wastes storage. Porous aluminas can be impregnated by liquid or gaseous species for precursors preparing and synthesis of porous compounds. Impregnation by magnesium, nickel or cobalt nitrate solutions followed by thermal treatment leads to spinels; silicon species can be used for mullite synthesis. Fibrious structures have high surface to volume ratio and possible transport is only along a fibers - this determines the structure formation during synthesis. The obtained porous spinels have finer microstructures and higher specific areas than those formed with α alumina. However, the nanometric size of Al₂O₃ allows reaction at lower temperatures.

O.S.B.I.I.

CORROSION OF Ti_3SiC_2 AND Ti_4AlN_3 IN CONCENTRATED HCl SOLUTIONS

V. D. Jović

Center for Multidisciplinary Studies, University of Belgrade, Belgrade, Serbia and Montenegro

Ti_3SiC_2 and Ti_4AlN_3 belong to the group of new class of solids, thermodynamically stable nano-laminates, or MAX phases. These materials are characterized by layered structures with unit cells of the type 211, 312 and 413, where M represents metal from the group of transition metals (IIIB, IVB, VB and VIB), A is element from groups of elements IIIA, IVA, VA and VIA, while X represents either C or N. Typical materials of this type are: Ti_2AlC , Ti_3SiC_2 and Ti_4AlN_3 . Basic properties of Ti_3SiC_2 are: high stability at high temperatures ($>1200^\circ\text{C}$), workability, high thermal and electric conductivity, plasticity at high temperatures and low density.

So far mechanical, electrical and thermal properties of these materials were investigated, while their corrosion behavior in aggressive solutions became a subject of research relatively recently. In this communication first results of detailed investigation of Ti_3SiC_2 corrosion and preliminary results of Ti_4AlN_3 corrosion in concentrated HCl solutions are presented. It is shown that during both, chemical and electrochemical corrosion irreversible formation of porous SiO_2 layer takes place onto Ti_3SiC_2 surface and that this layer prevents further corrosion of Ti_3SiC_2 . By the analysis of EIS results and Mott-Schottky plots it was found that this layer behaves as n-type semiconductor. A passive layer formed onto Ti_4AlN_3 during its corrosion showed p-type semiconductor properties. It was also shown that the rate of corrosion of these materials is for two-three orders of magnitude lower than that of pure titanium.

O.S.B.I.2.

AGING OF A COMMERCIAL Al-Cu-Si BASED ALLOY MODIFIED WITH GERMANIUM

V. Maksimović¹, S. Zec¹, V. Radmilović², M.T. Jovanović¹

¹Department of Materials Science, Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro, ²Department of Materials Science and Engineering, University of California, Berkeley, U.S.A.

The aim of this paper was to study the effect of small addition (0.7 wt.%) of germanium on aging kinetics of a commercial aluminum alloy with (in wt.%) 5.9 Cu, 0.28 Si, 0.6 (Fe, Ti, Mn, Zr, V). Aging was performed at 190°C in the interval ranging from 10 min to 300 h. Hardness measurements, light (LM) and transmission electron microscopy (TEM) and X-ray diffractometry (XRD) were used for material characterization during aging. It was found that the maximum hardness in alloy containing germanium was achieved two to three times faster than in the alloy without germanium. TEM results clearly revealed that the accelerated kinetics should be ascribed to heterogeneously nucleated Si-Ge particles serving as sites for dense and fine distribution of θ'' and θ' strengthening precipitates. Accelerated kinetics of aging was accompanied by increase in hardness and higher temperature stability.

O.S.B.I.3.

MECHANISM AND KINETICS OF AGING OF HIGH STRENGTH Cu-5wt.%Ni-2.5wt.%Ti ALLOY

M. Čančarević, M. T. Jovanović

Department of Materials Science, Institute of Nuclear Sciences »Vinča«, Belgrade, Serbia and Montenegro

Scanning electron microscopy, X-ray diffraction analysis and uniaxial tensile tests have been applied to study the mechanism and kinetics of aging of Cu-5wt.%Ni-2.5wt.%Ti alloy under the influence of static and dynamic applied stress. Hardening of alloy during aging is a consequence of precipitation of $(\text{Ni,Cu})_3\text{Ti}$ secondary particles with c.p.h. crystal structure, *i.e.* the same as η phase (Ni_3Ti). However, lattice parameters of $(\text{Ni,Cu})_3\text{Ti}$ phase are slightly changed implying that in the (Ni_3Ti) phase nickel atoms are partly replaced by copper atoms. During static and dynamic strain aging strength of alloy is increased compared to standard aging, the effect being most prominent during the dynamic process. The total concentration of vacancies participating in the process of aging during dynamic strain aging is increased compared to vacancy concentration during standard and static strain aging. This may be explained by the fact that vacancies are not annihilated on dislocations, but their concentration is preserved through vacancy – precipitate particles reaction.

O.S.B.I.4.

TiAl – A NEW HIGH TEMPERATURE MATERIAL FOR TURBOCHARGER ROTORS

S. Tadić, M. T. Jovanović, I. Bobić, S. Zec, B. Dimčić

Department of Materials Science, Institute of Nuclear Sciences »Vinča«, Belgrade, Serbia and Montenegro

TiAl intermetallic compounds represent a new class of heavy-duty construction material for application in the temperature range between 500 and 800°C. Compared with commercial titanium alloys, TiAl aluminides exhibit higher resistance to creep, oxidation and hydrogen fracture. In addition, the specific mass of this material is two times lesser than that of superalloys. Considering a significant breakthrough in the development of TiAl aluminides during the last few years, this material is on the verge of a commercial application. A prototype of a TiAl-based turbocharger rotor was produced by a precision casting process in a centrifugal vacuum furnace. A special method for production of ceramic mold has been applied. Optical microscopy and X-ray diffraction technique were performed for microstructural characterization.

O.S.B.I.5.

THE EFFECT OF α/β VOLUME FRACTION RATIO ON MICROSTRUCTURE AND MECHANICAL PROPERTIES OF A COMMERCIAL TITANIUM ALLOY

M. T. Jovanović, S. Tadić, S. Zec, Z. Mišković, I. Bobić

Department of Materials Science, Institute of Nuclear Sciences »Vinča«, Belgrade, Serbia and Montenegro

The commercial Ti-6Al-4V (wt.%) alloy was subjected to different heat treatment procedures. Samples were annealed at temperatures below and above $\alpha \rightarrow \beta$ transus temperature and then cooled with different rates to produce various ratios of α/β volume fraction. The purpose of the work was to study the effect of microstructure on the room temperature mechanical properties. Light microscopy, quantitative microscopy, X-ray diffraction, tensile tests and hardness measurements were performed for microstructural and mechanical characterization. The results show that strength increases with higher volume fraction of the β phase, whereas ductility decreases.

O.S.B.I.6.

HIGH-TEMPERATURE DEFORMATION BEHAVIOUR OF Ti₃Al-11Nb INTERMETALLIC

B. Dimčić, S. Tadić, M.T. Jovanović

Department of Material Science, Institute of Nuclear Sciences Vinča,
Belgrade, Serbia and Montenegro

Mechanical properties of Ti₃Al-based intermetallics are strongly influenced by the thermomechanical history. Since Ti₃Al intermetallics appear as a promising material for commercial high-temperature service, it is necessary to understand the deformation behaviour of hot-rolled material. The aim of this work was to study the high temperature strength and plasticity in terms of compressive stress-strain curves. The alloy with Ti₃Al-11Nb (at.%) was produced in laboratory electric-arc furnace in argon atmosphere. In the next step, ingots were hot-rolled at 1100°C with aspect ratio 40:6. Specimens were tested in compression at temperatures from 600 to 950°C. Results were discussed in terms of work hardening and strain rate sensitivity.

O.S.B.I.7.

SUPERPLASTICITY OF HIGH – PURITY Ti-6Al-4V ALLOY

S. Tadić, B. Dimčić, M.T. Jovanović

Department of Material Science, Institute of Nuclear Sciences, Vinča,
Belgrade, Serbia and Montenegro

Superplastic phenomena of high – purity Ti-6Al-4V (biomedical quality) were investigated. Controlled thermomechanical treatment in the two-phase region results in high degree of grain refinement. The influence of thermomechanical and subsequent heat treatment on superplastic behaviour was described. Strain rate jump tension tests were performed in the temperature range from 600 to 900°C. The strain rate sensitivity and elongation to failure were measured. The highest m-values and elongation were obtained just below $\alpha \rightarrow \beta$ transus temperature. Somewhat lower values of elongation compared to those of commercial purity alloy, could be ascribed to a rapid grain growth, which is a consequence of lack of interstitials.

O.S.B.I.8.

AGING EFFECTS IN Cu-Zn-Al SHAPE MEMORY ALLOY

V. Asanović, K. Delijić, Z. Leka

Faculty of Metallurgy and Technology, Podgorica, Serbia and Montenegro

The effects of quenching and aging treatments on the structure, properties and precipitation kinetics in a Cu-22.3Zn-5.1Al (mass%) shape memory alloy have been investigated. The martensitic transformation temperature, M_s , during isothermal aging from 200 to 400°C decreases with aging time at each aging temperature. The tensile ductility and yield strength of this alloy were significantly reduced by aging at 400°C. The periods of isothermal aging required to initiate precipitation of α -phase have been examined at various temperatures, then the time-temperature-transformation (TTT) diagram is constructed. The apparent activation energy estimated from the loss of shape memory recovery was similar with activation energy of α -precipitation in the alloy.

O.S.B.I.9.

PREDICTION OF PRECIPITATION BEHAVIOR OF SELECTED ALLOYS USING ANOVA METHOD

Z. Cvijović¹, G. Radenković², V. Maksimović³, B. Dimčić¹

¹Faculty of Technology and Metallurgy, Belgrade,

²Faculty of Mechanical Engineering, Niš,

³Materials Science Department, Vinča Institute, Belgrade, Serbia and Montenegro

The optimisation and accurate prediction of the precipitation behavior of metallic alloys are made problematic by the complexity of the relationships between process variables and precipitation kinetics. In order to make the correct choice of the processing parameters for any particular alloy, it is necessary to determine a single and combined effect of various parameters. If there are not enough data concerning their selection a large number of costly and time consuming experiments need to be carried out. In recent years, however, adaptive numerical methods represent a powerful empirical tools for modelling and classifying complex datasets. As such, various attempts have been made to apply these techniques to materials processing. In the present work, ANalysis Of VAriance (ANOVA) data modelling approach has been used. Case studies involving the modelling of σ phase precipitation kinetics in duplex stainless steel and age hardening of 2219 aluminum alloy microalloyed with Ge and/or Si are presented. The models identified the most influential parameters and were able to produce reasonable modelling accuracies.

O.S.B.II.1.

**EFFECT OF POLAR ALUMINIUM TRIHYDRATE MOLECULES ON THE
DIELECTRIC RELAXATIONS OF LOW-DENSITY POLYETHYLENE**

G. Stamboliev, D. Miličević, E. Suljovrujić, D. Kostoski
Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

The effects of high concentrations of polar aluminium trihydrate (ATH) molecules on the dielectric relaxations of low-density polyethylene (LDPE) have been studied using dielectric loss ($\tan \delta$) measurements in the temperature range from 25 to 370 K. It was found that there are strong effects of polar ATH molecules on the α and β relaxation peaks, but no effect on the γ relaxation peak which usually attributed to the localized conformational changes such as crankshaft or kink motion of the main chain in the amorphous phase surface layers of LDPE. Both strong α and β peaks are shifted to the lower temperatures with increasing concentration of ATH into the polymer. This behaviour of α and β dielectric relaxations of LDPE were related to the morphological changes in the amorphous and crystal phase of highly doped semicrystalline polymer.

O.S.B.II.2.

**DETERMINATION OF THE THERMAL PROPERTIES OF A THIN METALLIC
FILM/POLYMER/THIN METALLIC FILM SYSTEM BY PHOTOTHERMAL
SPECTROSCOPY**

S. Galović, D. Kostoski
Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

Starting with the generalized model of photothermal spectra that include thermal memory effects [S. Galovic and D. Kostoski, *J.Appl. Phys.*, vol. 93 (5), pp. 3063-3070, 2003], we derived model of the photothermal spectra of three-layer systems with thermal memory. The theoretically model shows very complex dependence on thermal properties of the consisting layers and is not applicable for solving inverse spectroscopy problem. In the specifically case of *thin metallic film/polymer/thin metallic film* systems, analytical description of the direct photothermal problem is simplified by additional analyzes. That has made possible the establishing of an inversion procedure for evaluating dominant system thermal properties.

O.S.B.II.3.

THE INFLUENCE OF THE STRUCTURE AND COMPOSITION ON THE PROPERTIES OF POLY(ESTER-SILOXANE) ELASTOMERS

V. V. Antić¹, J. Đonlagić²

¹IchTM-Center for Chemistry, Belgrade,

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

Two series of poly(ester-siloxane) elastomers were synthesized in this work: 1) series *A*, with different lengths of hard and soft segments and their constant mass ratio (57/43) and 2) series *B*, with a predetermined mass ratio of hard and soft segments in range from 70/30 to 40/60 and constant length of the soft-segment. The structure, composition and size of the poly(ester-siloxane)s were investigated by ¹H and ¹³C NMR spectroscopy, the viscometry of dilute solutions and complex dynamic melt viscometry. The transition temperatures of poly(ester-siloxane)s were determined by DSC and TMA measurements. The thermal and thermo-oxidative stability were investigated by thermogravimetric analysis (TGA), while the rheological properties of poly(ester-siloxanes) were investigated by dynamic mechanical spectroscopy (DMA).

O.S.B.II.4.

EQUILIBRIUM SWELLING BEHAVIOUR OF POLYURETHANES WITH ISOCYANURATE CROSSLINKS

J. Budinski-Simendić¹, T. Dikić¹, M. Ilavský², K. Dušek²

¹ University of Novi Sad, Faculty of Technology, Serbia and Montenegro

²Institute for Macromolecular chemistry, Academy of Sciences, Czech Republic

The polycyclotrimerization of diisocyanates can result in densely crosslinked networks with high thermal stability and good optical properties or excellent elastomeres for advanced technologies. This reaction in a bulk is a prerequisite for the preparation of low-loss photonic polymers (a core material in a multi-mode step-index polymer optical fiber) or for damping elastomers or sponges for magnetorheological fluid. In our work a transparent networks with a isocyanurate rings are prepared by cyclotrimerization of telechelic diisocyanates (based on 2,4-TDI and polyoxypropylene diol). Swelling ratios in benzene and xylene varied from 0.476 to 0.039 depending on the diol size. Equilibrium swelling behavior was linked to the network formation process and correlated with the crosslinking densities. The statistical theories of rubber elasticity, which give the description of the elastical behaviour due to the local conformation of elastically effective chains (induced by swelling or by application of a force), were used.

O.S.B.II.5.

**ELECTROCHEMICAL POLYMERIZATION OF 2-METHYL-1-NAPHTHYLAMINE
IN AN ACIDIC PERCHLORATE AQUEOUS MEDIUM**

G. Ćirić-Marjanović¹, I. Krakovsky², J. Budinski-Simendić³, S. Mentus¹

¹Faculty of Physical Chemistry, University of Belgrade, Belgrade,

²Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic

³Faculty of Technology, University of Novi Sad, Novi Sad, Serbia and Montenegro

Electroactive polymers based on polynuclear aromatic amines are promising candidates for applications as chemical sensors, electrochromic devices or electrocatalysts. Continuing our investigations relating to the electropolymerization of 1-naphthylamine, we expected that polymerization will be favored in general if CH₃ group is introduced in this molecule. In this work we have been studied the electropolymerization of 2-methyl-1-naphthylamine in the aqueous medium HClO₄ + LiClO₄ (pH1). It was found that the rate of the polymerization is of first order with respect to the monomer. The products of polymerization are electroactive and display two-step oxidation and reduction. IR-spectroscopy indicated that the polymerization occurs via N-C coupling, and that ClO₄⁻ ions are incorporated into the polymeric products. GPC of the polymerization products evidenced oligomers of molar masses up to 1600 g/mol as main species.

O.S.B.II.6.

**CRUCIAL ROLE OF ALKYL-SUBSTITUTED BENZENES IN THE FORMATION OF
INTERCALATE DERIVATIVES OF C₆₀**

A. Đorđević¹, M. Vojinović-Miloradov¹, A. Kapor¹, D. Lazar¹, D. Petrović², M. Hegediš

¹University of Novi Sad, Faculty of Natural Sciences and Mathematics, Novi Sad,

²University of Novi Sad, Technical Faculty, Novi Sad, Serbia and Montenegro

New non-covalent intermolecular fullerene systems containing discrete C₆₀ and alcohol molecules (as intercalates) have been prepared from the saturated solutions of fullerene in xylene, ethyl-benzene, n-propylbenzene, tert-butylbenzene, n-butyl benzene (intercalation-enabling solvents into fullerene lattice- IES). Intercalates R-OH-C₆₀ were obtained in the direct synthesis of C₆₀ solution in xylene, ethyl-benzene, n-propylbenzene, n-butylbenzene with methanol, ethanol and isopropanol, respectively. IR spectra of all derivatives showed no change compared to the pristine C₆₀. There has also been no change in XRD spectra of C₆₀ intercalate derivatives in: ethylbenzene/ethanol; ethylbenzene/methanol; ksilen/methanol; tert-butylbenzene/methanol concerning the d-value, indicating that the compounds are isostructural with C₆₀. In cases of: ethylbenzene/isopropanol; ksilen/ethanol; ksilen/isopropanol; tert-butylbenzene/isopropanol; intercalate derivatives are different XRD-spectra. Alcohol-solvent (IES) system interacts with C₆₀ and forms the binary and ternary intercalate products. Binary and ternary intercalated system was confirmed with GC/MS analyses. In all cases binary and ternary intercalated systems, alkyl-substituted benzene played the role of "donor" of the intercalating agent – "guest" in the C₆₀ crystal form.

O.S.B.II.7.

FT-IR AND RAMAN STUDY OF COLLAGEN HYDROLYSATE AND $C_{60}(OH)_{24}$ INTERACTION

L. Matija¹, Đ. Koruga², M. Romčević³, N. Romčević³, N. Ignjatović¹, D. Uskoković¹

¹Institute of Technical Sciences of SASA, Belgrade, ²Faculty of Mechanical Engineering, Belgrade, ³Institute of Physics, Belgrade, Serbia and Montenegro

The discovery of fullerenes brings a new approach in the materials science and technology. Bearing in mind their extraordinary properties, fullerenes can be applied in many fields of technology and engineering, including biomedical engineering. Water-soluble fullerene, fullerols, are particularly of significant importance for application in pharmacy and medicine.

In this paper both theoretical and experimental approach of possible interaction between collagen hydrolysate and fullerol $C_{60}(OH)_{24}$ were considered.

Based on FT-IR and Raman spectroscopy, bands I, II and III, from collagen hydrolysate were analyzed, and in the case of fullerol, band of OH group, was investigated, too.

Based on experimental results, possible types of interaction between collagen hydrolysate and fullerol $C_{60}(OH)_{24}$ have been considered.

O.S.B.II.8.

STUDY OF THE INCREASED TEMPERATURE INFLUENCE ON DEGRADATION OF THE PHOTODETECTORS THROUGH IDEALITY FACTOR

A. Vasić¹, P. Osmokrović², S. Stanković³, B. Lončar⁴

¹Faculty of Mechanical Engineering, Belgrade, ²Faculty of Electrical Engineering, Belgrade

³Vinča Institute of Nuclear Sciences, Belgrade, ⁴Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

Degradation of electrical and optical characteristics of the photodetectors in the increased temperature conditions is one of the most important limitation factors for their application. Since most of the electrical processes in semiconductor devices depend, in some extent, on the temperature, investigations at temperatures higher than room temperature may reveal possible changes in output characteristics of the device. Temperature dependence of the current-voltage characteristics could suggest the dominant current flow mechanism, and values of the ideality factor (n) and $n(T)$ dependence could also indicate presence, location and type of impurities and defects. This is specially important when impurities that are localized near dislocations in the material have energy levels deep in the energy gap. Such localized energy states could act as traps or recombination centers for charge carriers, modulating output current and inducing current noise in photodetector devices. So called extent current (fluctuations in the output current), indicates the presence of both generation-recombination and burst noise. Magnitudes of these fluctuations are directly connected to the ideality factor and temperature, so monitoring of the $n(T)$ dependence could not only indicate the changes (degradation) in electrical properties of the photodiodes, but optical also.

O.S.B.II.9.

THE INFLUENCE OF MICROSTRUCTURE ON DUCTILE FRACTURE INITIATION IN LOW-ALLOYED STEEL

M. Rakin¹, Z. Cvijović¹, V. Grabulov², N. Gubeljak³, A. Sedmak⁴

¹Faculty of Technology and Metallurgy, Belgrade, ²Military Technical Institute, Belgrade,

³Faculty of Mechanical Engineering, Maribor, Slovenia, ⁴Faculty of Mechanical Engineering,
Belgrade, Serbia and Montenegro

In this paper the quantitative microstructural analysis of low-alloyed pressure vessel steel has been discussed. The values of volume fraction and mean free path of non-metallic inclusions determined in that way have been used in the numerical analysis. A series of elastic-plastic calculations of round specimens has been made using finite elements method under conditions of ductile fracture initiation of tested steel, followed by large plastic deformation. Void nucleation and growth in non-metallic inclusions and secondary-phase particles have been determined by applying two micromechanical models. The development of the damage has been observed on the specimens unloaded before final failure and cut up to central longitudinal and transversal plane. The connection between microstructural values and individual parameters of the models applied has been established, thus providing physical sense to these parameters.

O.S.B.II.10.

INFLUENCE OF ANNEALING ON STRUCTURE AND MAGNETIC PROPERTIES OF LAVES PHASE HfFe_2

J. Belošević-Čavor, B. Cekić, N. Novaković, N. Ivanović, M. Manasijević

Institute of Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro

The hyperfine fields (HFF) in the polycrystalline HfFe_2 binary compound were measured at ^{181}Ta probe ion sites using the time differential perturbed angular correlation (TDPAC) method. Analysis of TDPAC spectra obtained in measurements revealed two components. One of them corresponded to the magnetic perturbation with the value $B_{\text{hf1}}(\text{Ta}) = 13.82(7)\text{T}$ at room temperature and it was ascribed to the interaction at the regular position of Hf in the cubic C15 (MgCu_2 -type) structure of the HfFe_2 compound. The second component with hyperfine field value of $B_{\text{hf2}}(\text{Ta}) = 8.0(2)\text{T}$ is probably due to the presence of a minor amount of the hexagonal C14 (MgZn_2 -type) structure. Measurements showed that it had come to change in the ratio of different components of TDPAC spectra with annealing, but the values for hyperfine fields for both components haven't changed significantly. The origin of the hyperfine magnetic field and its difference in the two structures (C14 and C15) were discussed taking into account crystal structure effects.

O.S.B.II.11.

CALCULATIONS OF TRANSITION METAL LOCAL STRUCTURES MAGNETIC PROPERTIES IN Hf INTERMETALLIC COMPOUNDS

I. Radisavljević¹, N. Ivanović¹, V. Koteski², B. Cekić¹, M. Manasijević¹, D. Marjanović¹

¹Laboratory of Nuclear and Plasma Physics, Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro, ²Present address: Hahn-Meitner Institut, Berlin GmbH, Bereich Strukturforschung, Berlin, Germany

In order to investigate microscopic foundations of magnetism in various Hf-Fe and Hf-Co intermetallic systems, we performed calculations of their local sub-structures formed by Fe(Co) atoms using Linear Combination of Atomic Orbitals (LCAO) method. The calculations show that there are some significant differences between the electronic properties of the same local sub-structures formed by Fe(Co) atoms which could be extended to the macroscopic characteristics of intermetallic compounds which these two transition metals form with Hf.

O.S.B.II.12.

STRUCTURAL STABILITY OF SOME Hf – TRANSITION METAL INTERMETALLIC COMPOUNDS OF 50:50% ATOMIC RATIO

N. Novaković, N. Ivanović, I. Radisavljević, J. Belošević-Čavor, B. Cekić

Laboratory of Nuclear and Plasma Physics, Institute for Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro

We performed *ab initio* FP LAPW using WIEN97 program package, and tight-binding calculations of HfMn, HfFe, HfCo and HfRh intermetallic compounds, in order to investigate their structural stability. HfCo and HfRh have CsCl crystal structure, so the same structure was assumed for HfFe and HfMn, which, for some reason, don't appear in their phase diagrams. Volume relaxation FP LAPW calculations of investigated compounds showed that cohesion energies stands in order HfFe > HfRh > HfCo > HfMn. We believe that possible reason for nonexistence of the most stable HfFe compound could be local stoichiometry violation due to preferred formation of local clusters of more stable HfFe₂ and Hf₂Fe compounds, in the early stage of nucleation or (and) magnetism which is common in this phase diagram.

O.S.B.II.13.

THERMAL DIFFUSIVITY OF COLD SINTERED Co

M.D. Dramićanin¹, Z. Ristovski²

¹Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro, ²School of Physical and Chemical Sciences, Queensland University of Technology, Brisbane, Australia

Cold sintering of cobalt powder (up to 1.2 GPa) was accompanied with measurements of density and thermal diffusivity. Sample microstructure is monitored by electron scanning microscopy. Dependence of density change upon pressing pressure is derived. A formula is presented for the thermal conductivity of porous granular materials on the basis of the effective medium theory.

O.S.B.III.1.

NONDESTRUCTIVE EVALUATION OF SEMICONDUCTOR THERMOELASTIC PROPERTIES BY MEANS OF PHOTOACOUSTIC SPECTROSCOPY

M. D. Dramićanin

Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro

Photoacoustic amplitude and phase spectra in low and medium frequency regions are regularly used for nondestructive determination of semiconductor thermal and electronic transport properties. High frequency regions of photoacoustic spectra contain information about semiconductor thermoelastic properties. A quantitative study of photoacoustic signal on high frequencies is performed and nondestructive method for evaluation of electronic strain coefficient and thermal expansion coefficient is established.

O.S.B.III.2.

THE EFFECT OF PRESSURE ON THE LUMINESCENCE OF $\text{LaMgAl}_{11}\text{O}_{19}:\text{Cr}^{3+}, \text{Nd}^{3+}$

B.R. Jovanić¹, B. Viana²

¹Institute of Physics, Center of Experimental Physics, Lab. Multidisc.Res., Zemun, Serbia and Montenegro, ²Ecole Nationale Supérieure de Chimie de Paris, Chimie Appliquée de l'Etat Solide, E.N.S.C.P., Paris Cédex 05, France

The effect of hydrostatic pressure at room temperature on the emission spectra and fluorescence lifetime of $\text{LaMgAl}_{11}\text{O}_{19}:\text{Cr}^{3+}, \text{Nd}^{3+}$ crystals up to 99.88 kbar have been studied. From the position of the R peak ($^2\text{E} \rightarrow ^4\text{A}_2$ transition) in the emission spectra we estimated the pressure induced red-shift. An important variation of the fluorescence lifetime values for $^2\text{E} \rightarrow ^4\text{A}_2$ transition is observed. The pressure induced red shift and lifetime variation could be described by simple models. In the considered pressure range (0-100 kbar) good agreements between measured and predicted values was obtained.

O.S.B.III.3.

SITE OCCUPATION PREFERENCES IN MULTICOMPONENT SEMICONDUCTORS: THE CdZnTe CASE

N. Ivanović¹, V. Koteski^{1,2}, H.-E. Mahnke²

¹Laboratory of nuclear and plasma physics, Institute of nuclear sciences "Vinča", Belgrade, Serbia and Montenegro, ²Hahn-Meitner Institut, Berlin GmbH, Bereich Strukturforschung, Berlin, Germany

Various models for site occupation preferences (SOPs) in multicomponent semiconducting compounds of the zincblende structure type are discussed, and tested for the $\text{Cd}_x\text{Zn}_{1-x}\text{Te}$ case using our new experimental and calculated data. In order to resolve the microscopic mechanism of the phenomenon, appropriate two-body potentials and stability of different tetrahedral configurations that can arise in the structure are computed using the "ab initio" Linear Combination of Atomic Orbitals (LCAO) method. The obtained results are related to some known material properties and existing systematics.

O.S.B.III.4.

STRUCTURE AND PROPERTIES OF NON-STOICHIOMETRICAL PEROVSKITES DOPED WITH ME OR/AND RE IONS

N. Kulagin

Kharkov National University for Radioelectronics, Kharkov, Ukraine

The communication is devoted to discuss of the separate problems of crystal growth, study of the crystallographic structure and stoichiometry on one hand and spectral properties (optical absorption and luminescence, ESR, X ray spectroscopy etc) on other hand for perovskites crystals ABO_3 doped with iron or/and rare earth groups elements.

The follow questions are discussed

- crystalline structure of non-stoichiometrical crystals;
- change of the electronic state of regular ions and change of the electronic structure of the crystals;
- influence of the impurities;
- symmetry of doped ions surroundings;
- change of the spectral parameters

New unusual physical properties and related new areas of employment of non-stoichiometry perovskite and garnet crystals doped with Me and/or RE ions are discussed, too.

O.S.B.III.5.

FAR-INFRARED SPECTROSCOPY OF $Pb_{1-x}Mn_xTe$ ALLOYS

N. Romčević¹, J. Trajić¹, M. Romčević¹, A. Milutinović¹, A.J. Nadolny², B. Taliashvili², V.N. Nikiforov³

¹Institute of Physics, Belgrade, Serbia and Montenegro

²Institute of Physics, Polish Academy of Sciences, Warsaw, Poland

³Department of Low-Temperature Physics, Moscow State University, Moscow, Russia

Far-infrared reflectivity spectra of $Pb_{1-x}Mn_xTe$ ($x \leq 0.1$) single crystals and $Pb_{1-x}Mn_xTe$ ($x \leq 0.12$) thin solid films were measured in the $40-600\text{cm}^{-1}$ range at temperatures 80-300K. Bulk crystals were grown by the modified Bridgman method, while films were grown by molecular beam epitaxy. The analysis of the FIR spectra was made by a fitting procedure. In the case of bulk crystals we used the model of coupled oscillators. We found that the long wavelength optical phonons modes of the mixed crystals showed an intermediate one-two mode behavior. A numerical model for calculating the reflectivity coefficient for complex systems, which includes film, buffer layer and substrate, has been developed too. The far-infrared spectra of thin films consist of the $Pb_{1-x}Mn_xTe$ modes, as well as the modes from the buffer layer (PbTe) and the substrate (BaF_2). The position of Mn local mode is 190cm^{-1} for bulk crystals and 150cm^{-1} for thin layers. That is discussed in terms of a model, which takes into account the appearance of Mn clusters in these systems.

O.S.B.III.6.

**DISPERSION OF REFRACTIVE INDEX OF THE NON-CRYSTALLINE
CHALCOGENIDES IN Cu-As-Se SYSTEM**

S.R. Lukić¹, D.M. Petrović¹, V.B. Petrović¹, D.D. Petrović²

¹Department of Physics, Faculty of Sciences, Novi Sad,

²Institute of Energy and Process Engineering, Novi Sad, Serbia and Montenegro

The objective of the present work was to characterize the refractive index of bulk samples and thin films of the amorphous system $\text{Cu}_x\text{As}_{50}\text{Se}_{50-x}$ for $x=5, 10, 15$ at%. This optical parameter was measured at room temperature, with an error of ± 0.01 . Dispersion of the refractive index of massive samples in the wavelength range 650 – 900 nm was studied by the prism method. Samples were prepared in the form of highly polished prisms of approximate dimensions 8×6×3 mm. For the samples in the form of thin films, refractive index was determined by using interference maxima appearing in the spectra of optical transparency. The results indicated that dependence of the refractive index shows the usual dispersion pattern and it increases with an increase in copper content in the sample.

PL.S.D.I.I.

**EFFECT OF STACKING SEQUENCE ON TENSILE STRENGTH OF
CARBON/EPOXY LAMINATES**

M.M. Stevanović, D.S. Marković, D.R. Pešikan-Sekulić
"Vinča" Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

Study of the effect of structure on tensile strength of carbon/epoxy laminates with different stacking geometry is exposed. Coupons with different width and depth, of cross-ply, angle-ply and quasi-isotropic laminates were tested under tensile loading.

Three-dimensional state of stress near coupon free edge was deduced by complementary energy minimization method. Calculated values of edge interlaminar stresses, strains and stored in the interlayer elastic strain energy of tested laminates, were correlated with appearance or absence of axial cracks in the interlayer, as well as, with measured strength values.

It was shown that the mechanism of interlaminar stresses effect on crack initiation in the interlayer and consequently on measured laminate strength values, is very complex and pointed-up that for different stacking geometry and different coupon dimensions, dominant factors determining edge effects are different.

O.S.D.I.1.

TESTING OF LAMINAR THERMOPLASTIC GLASS FIBRE-PVB COMPOSITE MATERIAL USING OPTICAL FIBERS AS SENSORS

I. Živković¹, Lj. Brajović², P. Uskoković³, R. Aleksić³

¹Institute of Security, Belgrade, ²Civil Engineering Faculty, Belgrade,

³Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

Embedding optical fibre sensors within laminar thermoplastic composite material, results in forming a system known as smart structure. These sensors present information about inner structure health during material exploitation and especially in case of exterior impacts when geometric configuration or property changes of material should be expected. This paper describes process of manufacturing laminar thermoplastic glass fibre-PVB composite material with simultaneous embedding of optical fibers using the hot-melt method. Produced composite material consists of PVB as a matrix and woven glass fabric as reinforcement. Measurements of optical signal intensity were conducted during the material static loading and low energy impact. Testing results confirmed a possibility of using of optical fibers as change intensity sensors in thermoplastic laminar composite materials glass fiber-PVB under real-time static and low-velocity impact loading.

O.S.D.I.2.

FATIGUE DAMAGE DETECTION IN COMPOSITE RODS USING FIBER OPTIC INTENSITY BASED SENSORS

Lj. Brajović¹, Z. Mišković¹, P. Uskoković², M. Simić¹, S. Putić², R. Aleksić²

¹Faculty of Civil Engineering, Belgrade,

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

An application of the embedded intensity based fiber optic sensors (FOS) for fatigue damage detection in cantilevered composite rods is presented. To apply a high cycle fatigue a special experimental set up was fabricated. During the fatigue test with constant amplitude of the oscillations the deflection of the rod as well as the intensity of optical signals were acquire permanently until the optical signal drop. Dynamic and static measurements were performed to evaluate the rigidity of the rod during the test and especially just after the optical signal drop. Numerical verification of the deformed rod, based on static measurements, is carried out by the model with six elements with different rigidity. Calculation of this variably rigidity system along the longitudinal axis is performed by application of initial parameter method where is incorporated second order theory. Calculated rigidity distribution is connected with the optical signal variation during fatigue tests.

O.S.D.I.3.

THERMAL STABILITY BEHAVIOR ANALYSIS USING SONIC MEASUREMENTS

T. Volkov-Husović¹, R.M. Jančić¹, J. Majstorović², M. Cvetković²

¹Faculty of Technology and Metallurgy, Belgrade,

²Faculty of Mining and Geology, Belgrade, Serbia and Montenegro

Thermal stability of the alumina based refractory material was investigated using water quench test as experimental method. Dynamic Young modulus of elasticity was calculated using measured values of longitudinal (V_p) and transversal (V_s) ultrasonic velocities. Values of dynamic Young modulus and changing in compressive strength during testing were presented as function of the measured number of quench experiments. Anisotropy of the samples during testing was also discussed. Changing in resistance parameters caused by thermal shock was presented, also. Analysis of the thermal shock behavior of the samples based on the obtained results was given.

O.S.D.I.4.

THE EFFECT OF NUCLEANTS ON THE CRYSTALLIZATION BEHAVIOR OF ISOTACTIC POLYPROPYLENE

J. Budinski-Simendić¹, Z. Petrović², V. Lazić¹, R. Radičević¹, V. Divjaković³

¹University of Novi Sad, Faculty of Technology, Novi Sad

²Kansas Polymer Research Center, Pittsburg State University, USA

³Institute for Physics, Faculty of Natural Sciences, Novi Sad, Serbia and Montenegro

Polypropylene films are using extensively in food packaging applications due to its low vapor and oxygen permeabilities. It is considered that permeability varies with the square of the polymer amorphous fractions. We have been studied the crystallization of isotactic polypropylene in the presence of different nucleants (pyromelitic anhydride, NaCl, SiO₂). The crystallization kinetics, melting points, and degree of crystallinity were determined by DSC method. It is estimated that crystallization behavior depends not only on the melt undercooling but also on the structure of nucleants. The equilibrium melting points were estimated through the linear extrapolation. Lammellar thicknesses and relative amount of thermodynamically less stable β -modification were estimated by the wide-angle x-ray diffractometer with monochromatic radiation (Philips).

O.S.D.I.5.

INFLUENCE OF THE OXIDE SOL PROPERTIES ON THE CAPACITIVE BEHAVIOR OF CARBON SUPPORTED HYDROUS RUTHENIUM OXIDE

V. Panić¹, A. Dekanski¹, S. Gojković², S. Milonjić³, V. Mišković-Stanković², B. Nikolić²
¹ICTM – Department of Electrochemistry, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, ³Institute of Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro

The composite material, consisted of high surface area carbon black support impregnated by hydrous ruthenium oxide (RuO_xH_y), has the excellent capacitive properties, which makes it a promising candidate for the use in so called electrochemical supercapacitors. The composite having extremely high capacitance as the sum of carbon double layer capacitance and oxide pseudocapacitance, can be prepared starting from RuO_xH_y colloidal dispersion. The chemical and physical properties of the oxide particles appeared to play a key role in final capacitive properties of composite material. In this work, the influence of RuO_xH_y sol preparation conditions, such as preparation procedure (forced hydrolysis of chloride and hydrolysis of alcocide), the ageing time and pH of a dispersion and sol sythesis medium, on the properties of prepared composite is investigated. The composite capacitive properties are examined by cyclic voltammetry and electrochemical impedance spectroscopy.

O.S.D.I.6.

THE EFFECTS OF MgO ON SOME PROPERTIES OF POLYPROPYLENE - WOOD COMPOSITES

M. Điporović¹, E. Dingova², J. Miljković¹
¹Faculty of Forestry of Belgrade University, Belgrade
²Chemical Industry "HIPOL" plc, Odžaci, Serbia and Montenegro

Maleic anhydride (MA) in the form of PP powder previously impregnated with certain quantity of MA was frequently used as a coupling agent for production of polypropylene - wood flour (PP-WF) composites. It was found, that MA reliably improves adhesion at the wood - polypropylene interface, thus creating composites with better mechanical properties. The achievement of effective coupling action already at 1,7% of MA addition, together with its favorable accessibility and relatively low price, recommend it for this purpose.

However, the addition of MA simultaneously reduced toughness of resulting composites. This study was conducted to examine the influence of MgO addition on toughness of PP-WF composites made with MA coupling agent. The mass ratio PP vs. WF in those composites was 1:1.

In the same time, the effect of vacuum drying of produced composites before their molding and pressing was studied, too.

PL.S.C.I.I.

**DUCTILE, MACHINABLE TERNARY CARBIDES AND NITRIDES:
A NEW CLASS OF SOLIDS: POLYCRYSTALLINE NANOLAMINATES**

M. W. Barsoum

Department of Materials Science and Engineering, Drexel University, Philadelphia, USA

With over 75 refereed publications and 8 patents in the past 7 years we have made tremendous progress in understanding the properties of a new class of layered, hexagonal ternary carbides and nitrides with the general formula: $M_{N+1}AX_N$, where $N = 1$ to 3 , M is an early transition metal, A is an A-group (mostly IIIA and IVA) element and X is either C and/or N. In all of these compounds, XTi_6 layers are separated from each other by layers of pure A . These carbide and nitrides, which total over 60, represent a *new class of solids: thermodynamically stable nanolaminates* - a hitherto unknown and uncharted category of solids with unique chemical, physical electrical and mechanical properties. They combine some of the best attributes of metals and ceramics. Like metals, they are electrically and thermally conductive, most *readily machinable* (manual hack saw will suffice!) not susceptible to thermal shock, plastic at high temperatures, and exceptionally damage tolerant. Like ceramics, they are elastically rigid, lightweight, and most important, maintain their strength to temperatures that render the best of today's superalloys *unusable*. In the case of Ti_3SiC_2 also creep, fatigue and oxidation resistant. With proper alignment of the grains, they are ductile at ambient temperature. Furthermore, basal planes of Ti_3SiC_2 possess very low coefficients of friction ($\approx 3 \times 10^{-2}$) that are quite robust vis-à-vis exposure to the atmosphere. Three interrelated characteristics distinguish these phases from other layered materials: i) the metallic-like nature of the bonding; ii) basal slip, and *only* basal slip, is operative down to at least 77K and, iii) they deform by a unique combination of kink and shear band formation together with delaminations. Very recently - using nothing more sophisticated than an extensometer and a load cell - we documented a *new* physical phenomenon in the deformation of solids: *fully reversible, dislocation-based deformation* (Nature Materials, Feb. 2002). We showed that polycrystalline Ti_3SiC_2 cylinders can be repeatedly compressed at room temperature, up to 1 GPa, and fully recover upon the removal of the load. The stress-strain curves are non-linear, outline fully reversible reproducible closed loops whose size and shape depend on grain size, but not strain rate. The energy dissipated per cycle is of the order of $\approx 1 \text{ MJ/m}^3$, a value closer to rubber than to crystalline solids. At the grain level we have shown that it is possible to nanoindent grains of Ti_3SiC_2 with up to $\approx 15 \text{ GPa}$ stress, dissipate $\approx 25 \%$ of the mechanical energy and *not* be able to find any trace of the indentation. This hitherto unreported phenomenon is attributed to the formation and annihilation of incipient kink bands. The technological implications of having these naturally nanolayered materials will be discussed.

O.S.C.I.1.

KINETIC STUDIES OF MOCVD PRECURSORS AS A BASIS TO STEER Al_2O_3 FILMS CHARACTERISTICS

G. A. Battiston, D. Berto, G. Carta, R. Gerbasi
CNR, Istituto di Chimica Inorganica e delle Superfici, Padova, Italy

Due to their peculiar physical and mechanical properties, such as high dielectric constant, hardness, and corrosion resistance, alumina thin films have found several applications both in electro-optical devices, and in oxidation and wear-resistant coatings.

A large series of stable and easy to synthesise precursors of alumina were taken into consideration. Aluminium compounds with three principal ligands were exploited: alkyl, alkoxide, and acetylacetonate ($\text{acac} = \text{C}_5\text{H}_7\text{O}_2$) aluminium compounds ($\text{R}_2\text{AlR}'$ or R_3Al , or $\text{R}_3'\text{Al}$, $\text{R} = \text{Me, Et, } i\text{Bu}$; $\text{R}' = \text{acac, O}^i\text{PR, OEt, OBu}$) that are liquid, highly volatile, and easy to synthesise and purify. These precursors have been chosen and compared to each other, with the aim of understanding how the steric hindrance of the alkyl substituent can influence the efficiency of the MOCVD process in the production of Al_2O_3 uniform thin films.

O.S.C.I.2.

THE SYNTHESIS OF CARBON NANOSTRUCTURES WITH MECHANICAL ALLOYING

M. Drofenik¹, D. Makovec²

¹Faculty of Chemistry and Chemical Engineering, University of Maribor,

²Ceramics Department, Jožef Stefan Institute, Ljubljana, Slovenia

The formation of carbon nano-structures during high-energy milling (mechanical alloying) has been studied. A powder mixture of graphite (saw dust) and soot in different ratios was milled in a high-energy ball mill SPEX 8000 using steel balls and vials. The nano-structures formed during milling were characterized using high-resolution transmission electron microscopy (HREM). In the matrix of thin, plate-like carbon particles, the nano-structures in form of the nano-rods appeared. Those nano-rods were typically from 4 to 10 nm wide and from 20 to 50 nm long. Frequently, they were folded and showed dome-shaped tips. Apart from those relatively perfect nano-rods, some nano-rods of irregular shape were present, most probably broken by continuation of milling after they were already formed. The formation of those nano-rod structures during high-energy milling will be discussed.

O.S.C.I.3.

***n*-ALKANE NANOPARTICLES IN CRYOGENIC
TRICHLOROFLUOROMETHANE/*n*-ALKANE SYSTEMS: THEIR USE IN THE
STUDY OF THE σ -BASICITY OF *n*-ALKANES**

Jan Ceulemans

K.U.Leuven, Leuven, Belgium

Under cryogenic conditions, *n*-alkane nanoparticles are formed in trichlorofluoromethane/*n*-alkane systems. The size of these nanoparticles can be controlled through experimental parameters, such as the concentration and chain length of the *n*-alkane solute, and may range from essentially monomolecular to aggregates large enough to crystallize (*n*-alkane nanocrystals). A method has been developed to determine the physical state (crystalline vs. amorphous) of the *n*-alkane nanoparticles. The direct use of the *n*-alkane nanoparticles is not so much technological but scientific. γ -Irradiated cryogenic trichlorofluoromethane/*n*-alkane systems have proven invaluable in the study of symmetric proton transfer from alkane radical cations to alkane molecules, a reaction process that appears to be characterized by quite intriguing site selectivity with respect to both the site of proton donation and proton acceptance. Such investigations are currently leading to a complete revision of the σ -basicity scale of long chain *n*-alkanes, information that may be of great technological importance relating to acid-catalyzed conversion (isomerization and cracking) of petroleum products.

O.S.C.I.4.

**THE DEFORMATION AND FAILURE OF HIGH-STRENGTH NANOSTRUCTURED
ALLOYS BASED ON FE AND AL**

N. Noskova, N. Vildanova, R. Churbaev

Institute of Metal Physics of UD RAS, Ekaterinburg, Russia

The deformation of Fe-based alloys ($\text{Fe}_{73.5}\text{Cu}_1\text{Nb}_3\text{Si}_{13.5}\text{B}_9$, $\text{Fe}_{60}\text{Cr}_{18}\text{Ni}_7\text{Si}_3\text{B}_{12}$ and $\text{Fe}_{60}\text{Cr}_{18}\text{Ni}_7\text{Si}_5\text{B}_{10}$) and Al-based alloys Al-(Mg, Hf, Ce, Zr, Sn, Re) firstly was examined *in situ* in an electron microscope. The experimental results permitted determining physical parameters responsible for a high-strength state of alloys. It was shown that a high-strength state is realized if grains are not over 80 nm in size. A nanocrystalline material is deformed through a dislocation or combined (dislocation - rotational) mechanism. If nanograins are less than 30 nm in size, the boundary shear modulus is nearly three times smaller than the shear modulus of the grain volume in a nanocrystalline material. The material is deformed only by rotational modes.

It was shown that a fracture of a material causes coalescence of pores and microcracks formed at nanograin boundaries during deformation. If a nanocrystalline material has a high level of internal elastic stresses, it experiences a brittle fracture independently of the nanograin size. When internal elastic stresses decrease in a nanocrystalline material, the effect of the nanograin size shows up as a rise of plasticity with reference to plasticity of a coarse-grain material, all other test conditions being equal.

O.S.C.I.5.

**THE STRUCTURE AND MAGNETIC PROPERTIES INDUCED BY DIFFERENT
CONDITION OF NANOCRYSTALLIZATION IN FE AND CO BASED AMORPHOUS
SOFT MAGNETIC ALLOYS**

N. Noskova, A. Potapov, V. Shulika, V. Lukshina,
Institute of Physic Metals UD RAS, Ekaterinburg, Russia

The influence of annealing temperature, rate of cooling, magnetic field frequency under thermo magnetic treatment on the hysteresis loop shift field value and the structure of $\text{Fe}_{50}\text{Co}_{70}\text{Si}_{15}\text{B}_{10}$ and $\text{Fe}_{60}\text{Co}_{20}\text{Si}_{15}\text{B}_{15}$ amorphous alloys samples has been studied. The study of the structure of amorphous ribbons after different thermo magnetic treatments was carried out using the electron transmission microscope. The relation of the structural state of amorphous alloys with the shift field value of the hysteresis loop has been studied. In the amorphous soft magnetic alloys tested the hysteresis loops shift in the temperature range of the thermo magnetic treatment 250-350°C, probably, is connected to domain structure stabilization. At higher temperatures the shift is due to the precipitation of fine grains with high coercivity. The structure of $\text{Fe}_{73.5}\text{Cu}_1\text{Nb}_3\text{Si}_{13.5}\text{B}_9$ samples with magnetic anisotropy induced during thermo mechanical treatment was examined by the method of transmission electron microscopy. A comparison of results of the magnetic and structural studies allowed determining the effect of the composition and the size of the phases, which appeared during nanocrystallization of the amorphous alloys.

O.S.C.I.6.

**COMPARISON OF DIRECT NUMERICAL PROCEDURE AND MONTE CARLO
TECHNIQUE TO DETERMINE THE CHARGING EFFECTS IN SUBMICRON
STRUCTURES**

Z.Lj. Petrović¹, S. Sakadžić¹, N. Spasojević¹, J. Matsui², T. Makabe²

¹Institute of Physics, Zemun, Serbia and Montenegro, ²Keio University 3-14-1 Hiyoshi,
Yokohama, Japan

Charging was found to be the cause of the largest number of defects in integrated circuits produced by plasma etching for high aspect ratio submicron structures (200 nm resolutions and smaller). Further improvement of the existing plasma processing tools requires accurate representation of charging and modeling of the development of etched profiles. In this paper we compare the results of fluxes of ions in micro trenches as a benchmark to verify the simpler and faster Direct Numerical Procedure that was used to model the plasma surface interface. It was found that reasonably good agreement is achieved except that numerical diffusion reduces the angular and spatial structures, which actually may be pronounced. Angular and energy dependences of incoming ions are also studied.

O.S.C.I.7.

CRYSTALLIZATION KINETICS STUDIES OF Fe-B BASED AMORPHOUS ALLOYS

P. Tomić¹, M. Davidović²

¹Alumina plant "Birač", Zvornik, Serbian Republic, Bosnia and Herzegovina

²Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

The crystallization processes of the amorphous transition –metal –metalloid glasses Fe-Si-B-Ni and Fe-B-Zr-Cu were investigated using X-rays diffraction measurements performed *in situ* during Joule-heating, with simultaneous monitoring of the electrical resistance. We determined the main structural transitions and crystalline phases formed during heating and correlated these results to the observed resistance variations. As the annealing current is increasing, the resistance shows an initial decrease due to stress relaxation, followed by the drop to a minimum value due to massive nucleation and growth of the α -Fe nanocrystals. Further annealing causes the formation of small fractions of Fe-B, B₂Zr or ZrO₂, while the resistance increases due to temperature enhancement. *In-situ* XRD measurements allowed the identification of metalstable phases, as the γ -Fe phase which occurs at high temperatures.

The exothermal peaks observed in the differential scanning calorimeter (DSC) for each alloy corroborate the results. We also have performed DSC measurements with several heating rates, which allow the determination of the Avrami exponent and crystallization activation energy for each alloy. The obtained activation energy (362 and 301 kJ/mol for Fe-B-Zr-Cu; 323 kJ/mol for Fe-Si-B-Ni) is comparable to reported values for amorphous iron alloys, with the Avrami exponent values ($n=1.0$ or $n=1.2$) are consistent with diffusion controlled crystallization processes with nucleation rates close to zero.

O.S.C.I.8.

SYNTHESIS AND PREPARATION OF NEW Fe-BASED SOFT MAGNETIC AMORPHOUS ALLOYS WITH A LARGE SUPERCOOLED LIQUID REGION

N. Mitrović, R. Simeunović, A. Maričić, B. Jordović

Joint Laboratory for Advanced Materials of SASA, Section for Amorphous Systems, Technical Faculty Čačak, Čačak, Serbia and Montenegro

Development of multicomponent magnetically soft ferrous group metal based amorphous alloys with a large supercooled liquid region has been a subject of increasing attention from scientific community due to simultaneously excellent soft magnetic properties and possibility to be prepared by quenching in an exact form of application directly from liquid state. Significant progress has been made over the last few years in their science and engineering such as understanding of their glass forming ability and synthesizing novel multicomponent systems with improved functional properties. In this study we presents our recent results on the synthesis, preparation and characterization of new amorphous alloys with a large supercooled liquid region in (Fe,Nb)-(Al,Ga)-(P,C,B) and Fe-(Co-Ni)-(Cu)-Zr-Nb-B multicomponent systems. They exhibit a large supercooled liquid region (T_x) defined by the temperature span between glass transition temperature (T_g) and crystallization temperature (T_x), ($T_x = T_g - T_x$). Melt spinning and suction casting in Cu-moulds were used to prepare amorphous ribbons, as well as rod samples with diameters up to 3 mm, respectively. The amorphicity of the samples was investigated by XRD, DSC and Mossbauer spectroscopy. The influence of alloy composition, preparation conditions and thermo or thermo-magnetic treatments on the physical properties is discussed.

O.S.C.I.9.

OPTIMIZATION OF INTERSUBBAND OPTICAL NONLINEARITIES IN CONTINUALLY GRADED AlGa_N QUANTUM WELL STRUCTURES

J. Radovanović^{1,2}, V. Milanović², Z. Ikonić^{2,3}, D. Indin^{2,3}

¹Institute of Physics, Belgrade, ²Faculty of Electrical Engineering, Belgrade, Serbia and Montenegro, ³Institute of Microwaves and Photonics, School of Electronic and Electrical Engineering, University of Leeds, Leeds, UK

A method is proposed for finding the optimal AlGa_N-based quantum well profiles with respect to specified intersubband optical properties, e.g. nonlinear optical susceptibilities at resonance. It is based on applying the isospectral transformations (supersymmetric and coordinate transform) to an initial Hamiltonian in order to generate a family of parameters controlled potentials, accompanied by position-dependent effective mass. By varying those control parameters, one can change the values of dipole matrix elements relevant for a particular effect, while energy levels, once obtained in the initial potential, remain unchanged. The internal electrostatic field, originating from piezoelectric and spontaneous polarization in the nitride alloy, has been taken into account. The use of the method is illustrated by maximizing second order nonlinear optical susceptibilities at wavelengths in the near infrared spectral range, and optimal smooth structures are eventually discretized to make their fabrication easier.

O.S.C.I.10.

GaAs/AlGaAs QUANTUM CASCADE LASER WITH HIGHLY DIAGONAL TRANSITIONS

A. Mirčetić^{1,2}, D. Indin^{1,3}, P. Harrison³, Z. Ikonić^{1,3}, R. W. Kelsall³, V. Milanović¹

¹Faculty of Electrical Engineering, Belgrade, ²"Telekom Srbija" a.d., Zone of Maintenance Pančevo, Pančevo, Serbia and Montenegro, ³Institute of Microwaves and Photonics, School of Electronic and Electrical Engineering, University of Leeds, Leeds, UK

In this paper we present the possibility of designing mid-infrared operating GaAs/AlGaAs quantum cascade lasers with improved output characteristics. The optimization was carried out by using the Simulated Annealing algorithm on step graded active region wavefunctions and maximizing the gain coefficient by prolonging the upper level carrier lifetime. Once an improved active region is obtained, the whole structure is recalculated self-consistently using the intersubband scattering model. Output characteristics of the optimized structures are presented.

O.S.C.I.11.

THERMODYNAMICAL AND KINEMATICAL PARAMETERS OF CYLINDRICAL QUANTUM WIRES

B.S. Tošić¹, V.D. Sajfert², J.P. Šetrajčić¹, S.K. Jaćimovski¹,

¹Department of Physics, Faculty of Sciences, University of Novi Sad,

²Technical Faculty "M. Pupin", Zrenjanin, University of Novi Sad, Serbia and Montenegro

Thermodynamical and kinematical characteristics of cylindrical quantum wires are investigated by Green's functions method. Green's functions of the type displacement-displacement and momentum-momentum were found. Internal energy, specific heat, density, diffusion coefficient and thermal conductivity were calculated using spectral intensities of Green's functions. At it was expected thermodynamical as well as kinetic characteristic are exponentially small at low temperature and consequently, considerably lower than corresponding ones of bulk structures. The contributions of zero oscillations were not taken into account. Due to the independency of two phonon subsystems for phonons propagating along axes and propagating in discs these subsystems are treated separately.

O.S.C.I.12.

SURFACE DENSITY ANALYTICAL MODEL OF TWO-DIMENSIONAL ELECTRON GAS IN HEMT STRUCTURES

R. Ramović¹, P. Lukić²

¹Faculty of Electrical Engineering, Belgrade,

²Faculty of Mechanical Engineering, Belgrade, Serbia and Montenegro

In this paper surface density analytical model of Two-Dimensional Electron Gas (2DEG) in High Electron Mobility Transistors (HEMT) under gate control, is presented. In the model, approximation of triangular quant gap was used. The results obtained using this model are in good agreement with the experimentally obtained results, and the results of very compound numerical simulations of HEMT devices, which are made of different materials including HEMT devices with strain crystal lattice. The model also gives relatively good results for surface density 2DEG in AlGaIn/GaN structures with piezoelectric effect, which has a great influence on density. Proposed model was used for simulations. Results of simulations were graphically presented and discussed.

PL.S.C.II.1.

NEW PROCESS ROUTES FOR ADVANCED CERAMIC NANOMATERIALS

D. Hourlier - Bahloul

UMR CNRS 6638, SPCTS, Limoges, Cedex, France

Novel ceramic processing techniques have been developed in order to overcome the limitations of the conventional methods. The focus for the new generation of high performance structural ceramic materials with predictable properties, lifetime reliability and environmental insensitivity is on ultra structure processing through chemical processes. Chemical processes include the organometallic route, polymer pyrolysis, nanopowder synthesis and processing and sol-gel processing. These processes, which offer control at the molecular or atomic level, contribute to improve the physical and mechanical properties by some orders of magnitude. These chemical processes can conceive a wide variety of binary, ternary and quaternary elemental compositions and non-stoichiometric compositions.

The present communication reports on the new approaches and the role of chemistry in the synthesis of ceramic materials.

PL.S.C.II.2.

MICROSTRUCTURE OF Mg BASED NANOCOMPOSITE FOR HYDROGEN STORAGE

A. Montone¹, M.Vittori Antisari¹, J. Grbović^{1,2}, E.Bonetti³, L.Pasquini³, A. Bassetti³, A. Fiorini³

¹Materials and Technology Unit, ENEA C.R. Casaccia, Roma, Italy,

²Permanent address: INN Vinča Department of Material Science, Belgrade, Serbia and Montenegro, ³Department of Physics, University of Bologna and INFN, Italy

Mg-based hydrides are among the most promising H-storage materials, especially when a high specific capacity is required, such as in automotive applications. Unfortunately, conventional Mg-based hydrides suffer from slow absorption/desorption kinetics and high reaction temperature.

A way to overcome kinetic limitations is through nano-structuring and nano-scale catalysis. In fact, a high concentration of surfaces/interfaces, typical of nanostructured materials, simultaneously provides nucleation centers for hydride formation and fast paths for H-diffusion. Additionally, the very fine dispersion of catalyst elements assists dissociation of H₂ molecules at the surface.

We report on the synthesis of Mg-based nanostructured hydrides by ball milling.

The microstructural characterization has been carried out by X-ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscope (TEM) equipped with ultra-thin window X-ray microanalysis and electron spectroscopic imaging. Hydrogen desorption behavior was evaluated through differential scanning calorimetry (DSC).

Several Mg-based hydrides were synthesized with different processing parameters in order to understand the structural stability of the nanocomposites hydrides, the role of the catalyst, of the microstructure and of the impurities on the sorption kinetics.

O.S.C.II.1.

SYNTHESIS AND SINTERABILITY OF NANOCRYSTALLINE TITANIA POWDERS

V.V. Srdić¹, K.A. Kumar², M. Winterer², H. Hahn²

¹Department of Materials Engineering, Faculty of Technology, University of Novi Sad, Serbia and Montenegro,

²Institute for Materials Science, Darmstadt University of Technology, Germany

The interest in nanocrystalline ceramics has enormously increased both in fundamental and applied research because of novel properties due to interfacial or size effects. However, the production of dense, ultrafine ceramics from powders imposes high demands on particle properties. Usually, nonagglomerated ceramic particles of high purity, high crystallinity, small particle size, narrow size distribution ensure optimum sinterability. In this work pure titania nanopowders were prepared by two different methods from titanium-alkoxide precursors. Chemical vapor synthesis (CVS) provides nanocrystalline, highly pure anatase powder of very small crystallite size (~4 nm), narrow size distribution, high surface area and very weak agglomeration. The as-synthesized pure titania nanopowder prepared by wet-chemical synthesis (WCS) is also crystalline, consisting of anatase, with similar small crystallite size (~4 nm) and high surface area, but a higher degree of agglomeration. Nearly dense nanocrystalline titania could be obtained from CVS powder by vacuum sintering at 750°C, but higher temperatures (900°C) are required for complete densification of WCS powder.

O.S.C.II.2.

**SCRATCH AND ABRASION RESISTANT POLYMERIC NANOCOMPOSITES –
PREPARATION, CHARACTERIZATION AND APPLICATIONS**

S. Stojanović, F. Bauer, H.-J. Gläsel, R. Mehnert

Leibniz-Institut für Oberflächenmodifizierung, Leipzig, Germany

Nano-sized pyrogenic silica was used as filler for UV/EB curable acrylates. In order to avoid highly viscous solutions due to the incompatibility of inorganic fillers with organic polymers, trialkoxysilanes were used as coupling agents. The acid catalyzed condensation of trialkoxysilanes enables favorable incorporation of silica into the acrylate matrix, thus resulting in the formation of acrylate-nanocomposite formulations with up to 35 wt.-% of silica. In this way surface modified silica is proposed to have a core-shell nanocapsule structure which was demonstrated by means of infrared, multinuclear MAS NMR and MALDI-TOF mass spectroscopy. After UV or electron beam (EB) curing of such formulations, crosslinked polyacrylate nanocomposite coatings with improved properties, e.g. scratch and abrasion resistance, heat resistance etc., are obtained. Therefore, the application of polymeric nanocomposite coatings is constantly increasing in the wood and plastics industry.

O.S.C.II.3.

FAR-INFRARED PHONON SPECTROSCOPY OF $\text{Cd}_{1-x}\text{Mn}_x\text{S}$ QUANTUM DOTS

R. Kostić¹, N. Romčević¹, M.I. Čomor², M. Romčević¹, M. Grujić¹, V.V. Vodnik², J.M. Nedeljković²

¹Institute of Physics, Belgrade,

²Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

Phonon spectra of $\text{Cd}_{1-x}\text{Mn}_x\text{S}$ ($x=0; 0.005; 0.10; 0.15$) quantum dots ($d \sim 5\text{nm}$) investigated by means of far-infrared reflection in spectral range $80\text{--}600\text{cm}^{-1}$ and temperature range $80\text{--}300\text{K}$. The $\text{Cd}_{1-x}\text{Mn}_x\text{S}$ quantum dots have been synthesized by using aqueous solution precipitation. The analysis of the reflection spectra was made by a fitting procedure. A numerical model for calculating the reflectivity coefficient for complex system, which includes surface active agent (in our case $\text{Na}(\text{PO}_3)_6$) and quantum dots ($\text{Cd}_{1-x}\text{Mn}_x\text{S}$) has been developed. Together with the modes of $\text{Na}(\text{PO}_3)_6$ and quantum dots CdS we obtain the new mode of Mn at about 100cm^{-1} . The position of this mode is discussed in the frame of linear chain model with both mass and force constant defects. The possibility of existence of ultra small nano-size clusters of MnS ($\sim 0.5\text{nm}$) in $\text{Cd}_{1-x}\text{Mn}_x\text{S}$ nanoparticles is also discussed.

O.S.C.II.4.

INFLUENCE OF SOLID/LIQUID RATIO ON THE POINT OF ZERO CHARGE OF ALUMINA

Ž. N. Todorović¹, S. K. Milonjić¹, S. P. Zec¹, V. T. Dondur²

¹Vinča Institute of Nuclear Sciences, Belgrade,

²Faculty of Physical Chemistry, Belgrade, Serbia and Montenegro

The point of zero charge, pH_{pzc} , of a solid is defined as the pH value at which the solid surface charge equals zero. The pH_{pzc} of eight commercial samples of aluminiumoxide in an aqueous KNO_3 ($10^{-3}\text{--}10^{-1}\text{mol/dm}^3$) solution was investigated using batch equilibration, mass titration and acid-base titration method. The alumina samples were characterized by XRD, IR and XRF spectroscopy. Potassium nitrate was an indifferent electrolyte for the investigated alumina samples. The obtained pH_{pzc} values (5 to 8) dependent on the crystalline structures and alumina/solution ratio. The pH_{pzc} value increased with increasing alumina/solution ratio to a constant value. Alumina dissolution was shown to be a parabolic function of pH, with minimum solubility at the pH_{pzc} .

O.S.C.II.5.

MICROEMULSION SYNTHESIS OF MnZn-FERRITE NANOPARTICLES

A. Košak¹, D. Makovec¹, M. Drofenik²

¹»Jožef Stefan« Institute, Ljubljana,

²Faculty of Chemistry and Chemical Engineering, Maribor, Slovenia

Precipitation in reverse microemulsions has been shown to be a very prospective technique for the preparation of ultrafine ferrite particles of controlled size and morphology. Reverse microemulsions are optically transparent and thermodynamically stable systems that contain tiny water droplets, stabilized by surfactant molecules in a low polar medium. The water droplets, surrounded by surfactant, act as micro-reactors for the synthesis of the ferrite nanoparticles.

Precipitation in a reverse microemulsion system of water – hexadecyltrimethyl ammonium bromide (CTAB) - hexanol was used to prepare monodisperse MnZn-ferrite nanoparticles with a narrow size distribution. We established the influences of pH, temperature, and time of reaction on a spinel phase formation.

The synthesized nanoparticles were characterized with magnetic measurements, transmission electron microscopy (TEM) and X-ray diffraction (XRD). The samples obtained with this technique had average particles size of about 4 nm.

O.S.C.II.6.

SYNTHESIS OF NANOCRYSTALLINE NICKEL-ZINC FERRITES VIA A MICROEMULSION ROUTE

V. Uskoković¹, M. Drofenik²

¹Advanced Materials Department, Institute "Jožef Stefan", Ljubljana,

²Faculty of Chemistry and Chemical Engineering, Maribor, Slovenia

Nanostructured NiZn-ferrites were synthesized using a low-temperature co-precipitation method within the reverse micelles of ternary CTAB/1-hexanol/water microemulsions. The influence of pH on the precipitation reaction was investigated. It was found that a higher pH value resulted in more crystalline particles. Subsequent oxidation of ferro ion precipitates, which leads to the formation of spinel ferrites, is discussed. Diffraction-lines broadening and specific surface area measurements yielded an average particle size of ~ 3 nm. The saturation magnetization of the samples was around 20 times smaller than for traditionally synthesized NiZn-ferrites, while the coercivities were 10 - 100 times larger than bulk NiZn-ferrites, which is consistent with the nanocrystalline nature of the synthesized magnetic material. TEM investigations were used to reveal the agglomerated nature of the synthesized samples, which is the reason why the samples do not show superparamagnetic behaviour.

O.S.C.II.7.

**MORPHOLOGY AND ELECTROCHEMISTRY OF PLATINUM / CARBON
AEROGEL NANOSTRUCTURES**

B. Babić¹, N. Krstajić²

¹Institute of Nuclear Sciences Vinča, Belgrade

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

Carbon aerogels are a unique form of carbon which can be characterized as having an open microstructure consisting of covalently linked interconnected chains of porous carbon microspheres forming a continuous three-dimensional ultraporous network [1 – 5].

The polycondensation of resorcinol with formaldehyde (RF) under alkaline condition results the formation of surface functionalized polymer "clusters". The covalent crosslinking of these "clusters" produces gels which are processed under supercritical conditions to obtain low density "inorganic aerogels". In preparation for critical point drying, the gels were then placed into an agitated acetone bath at 45 °C. The RF gels were allowed to stand in the liquefied carbon dioxide for a 4 h before flushing the system. Finally the RF gels were calcinated at 1050°C in the atmosphere of nitrogen. The obtained results showed that RF aerogels are produced in a fashion similar to silica aerogels.. Resorcinol reacts quickly with formaldehyde to form numerous hydroxyl-methyl substituted species. RF aerogels are easily produced in densities ranging from 0.035-0.100 g cm⁻³. The RF aerogels are composed of interconnected beads with diameters of 7 – 10 nm and cell sizes less than 100 nm.

The structure-properties relationships of nanostructured Pt / carbon aerogel composite materials have been evaluated. These new electrode materials were prepared via a novel metal vapor impregnation method. The resulting microstructure is characterized by highly dispersed Pt particles (≈ 20 – 30Å in diameter) attached to the carbon aerogel surface and distributed homogeneously through the material. The electrochemically active surface area was calculated from the voltammetric charge for under potential deposited hydrogen (H_{ads}). The obtained results showed that nanostructured Pt / carbon aerogel electrode possesses very high surface active area of 400 – 600 m² / g.

O.S.C.II.8.

STUDY OF SUPPORTED Pt AND PtRu CATALYSTS: METHANOL AND FORMIC ACID OXIDATION

A.V. Tripković, S. Štrbac, K.Đ. Popović, J.D. Lović

ICTM – Institute of Electrochemistry, University of Belgrade, Belgrade, Serbia and Montenegro

The catalysts are characterized by using TEM, HRTEM and STM techniques. STM images show a clear three-dimensional picture of the Pt nanoparticle distribution over the GC substrate which can not be provided by TEM analysis. The cubooctahedral shape of Pt islands and their sizes ranged from 3 – 6 nm are in a good agreement with TEM analysis. Twined Pt/Ru islands of cubooctahedral shape observed by HRTEM are also recognized on the STM images of Pt₂Ru₃ sample. Methanol and formic acid oxidation are studied at both catalysts from the kinetic and mechanistic point of view.

O.S.C.II.9.

LASER INDUCED GRAINY STRUCTURE DEVELOPED ON TiN COATINGS

B. Gaković, S. Petrović, T. Nenadović, M. Trtica

Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro

Extraordinary characteristics of titanium nitride such as high melting temperature, extreme hardness, wear and corrosive resistance, thermal and electric conductivity, etc. attract a lot attention in materials science. TiN in a form of thin films or coatings deposited on various substrates can be modified by pulsed lasers. The objective of this work was to investigate the effect of a *ns-laser system*, i.e. pulsed TEA CO₂ laser (FWHM=80-120 ns; wavelength-10.6 microns) on micro-structuring (primarily grain development) of TiN coatings deposited on steel and silicone substrates. The target was multi-pulse irradiated in air at 2 Hz repetition. The laser intensity was below the intensity needed for plasma formation in front of the TiN for single laser pulse. The characteristics of the developed grainy structure on the TiN surface were monitored by: optical, scanning electron, and atomic force microscopy. The homogeneity and size of the microstructure varied as a function of laser beam characteristics (laser pulse temporal shape, number of pulses, energy density) and coating properties (thickness, surface reflectivity), including the substrate type. Depending on these parameters the obtained grain size on the TiN surface was in the range from 0.7 microns to 2.5 microns.

O.S.E.I.1.

**THE POLYMER CONFORMATIONAL TRANSITIONS:
A QUANTUM DECOHERENCE THEORY APPROACH**

D. Raković¹, M. Dugić², M. Plavšić³

¹Faculty of Electrical Engineering, Belgrade, ²Department of Physics, Faculty of Science, Kragujevac, ³Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

In this paper we describe the problem of polymer conformational transitions in the framework of the so-called quantum decoherence theory. We propose a few rather qualitative scenarios yet bearing generality in the context of the quantum decoherence theory. It seems that our proposals provide promising basis for the solution-in-principle of this classically hard problem of the polymer kinetics.

O.S.E.I.2.

GIBBSON: PEPTIDE PLAIN AS A UNIQUE BIOLOGICAL NANOSTRUCTURE

Đ. Koruga¹, A. Tomić¹, Z. Ratkaj¹, L. Matija²

¹Faculty of Mechanical Engineering, University of Belgrade, Belgrade, ²Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro

When, in protein chain, two amino acids joint together they are losing one molecule of water. In same time, they, as primary biochemical entities, are losing their biochemical properties and become a new entity with primary biophysical properties. Bearing in mind that peptide plain is consist of six atoms, and that average number of peptide plane per protein, is about fifth hundred, average number of atoms are three thousand per one subunit like tubulin. It is small number that Maxwell-Boltzmann statistic could be valid, and we use Langrange equations to calculate energy states and explain their new biophysical properties. We found those not exist two peptide plains with same energy state. However, we found that energy distributions of peptide plains in protein chain are by Gibbson statistics, and we named peptide plane as the Gibbson. It is quasi particule with nanometar size and this knowlege in nanobiology can play role in nanotecnology.

O.S.E.I.3.

**CELL SUPPORT STUDIES AIMED FOR CARTILAGE TISSUE ENGINEERING IN
PERFUSED BIOREACTORS**

B. Obradović¹, B. Bugarski¹, D. Bugarski², M. Petakov², G. Jovčić², N. Stojanović², G. Vunjak-
Novaković³

¹Chemical Engineering Department, Faculty of Technology and Metallurgy, Belgrade; ²Institute
for Medical Research, Belgrade, Serbia and Montenegro; ³Division of Health Sciences and
Technology, Massachusetts Institute of Technology, Cambridge, USA

Cartilage tissue engineering based on chondrogenic cells seeded onto biodegradable polymer supports and cultivated in bioreactors can potentially become an effective method for creating functional tissue equivalents. Cultivation in perfused bioreactors can improve the uniformity and structure of the engineered tissues. In this study we have investigated different supports for attachment of mouse bone marrow stromal cells (BMSC) and cultivation in perfused bioreactors. Specifically, attachment and proliferation of cells on fibrous polyglycolic acid (PGA) scaffolds and alginate microbeads were investigated in Petri dishes in short-term studies. The effects of microbead size and structure were evaluated for potential cultivation in packed bed bioreactors while fibrous PGA scaffolds seeded with BMSCs were evaluated for cell differentiation and chondrogenesis over 3-week culture in a perfused bioreactor system.

O.S.E.I.4.

**PHYSICO-CHEMICAL PROPERTIES OF POLYMERIC AND COMPOSITE
BIORESORBABLE BARRIER MEMBRANES**

N. Ignjatović¹, A. Nastasović², V. Laninović³, A. Onjia⁴, M. Miljković⁵, D. Uskoković¹

¹Institute of Technical Sciences of SASA, Belgrade, ²IchTM- Center for Chemistry, Belgrade,

³IMS Institute, Belgrade, ⁴Vinča Institute of Nuclear Sciences, Belgrade,

⁵Laboratory for Electronic Microscopy, Medical Faculty, Niš, Serbia and Montenegro

Bioresorbable barrier membranes are widely used in dentistry and maxillofacial surgery. When the membranes are placed over bony defects and closely adapted to the surrounding bone face, an environment that prevents invasion of competing nonosteogenic cells from the overlying soft tissues can be created. The purpose of the present study was to establish whether there is an influence of production of different polymeric and composite membranes on physico-chemical properties, synthesised in our laboratory.

Physico-chemical properties were analyzed by differential scanning calorimetry (DSC), scanning electron microscopy (SEM) with energetic dispersive spectroscopy (EDS), inverse gas chromatography (IGC) and tensile strength test (TST).

Membranes with poly-L-lactides of 100000 and 430000 g/mol molecular weight have shown the highest degree of crystallinity. Membranes with poly-L-lactides of the greatest molecular weight have shown the highest tensile strength value, as expected. Surface microstructure, depending on the parameters of processing, was perforated with smaller or larger pores. Composite membranes with hydroxyapatite have a brittle fracture while determining tensile strength test, unlike polymer membranes whose fracture is classical for polymers.

Biocompatibility is in the direct connection with surface free energy. Consequently, obtained surface free energy values indicate good biocompatibility of bioresorbable barrier membranes.

O.S.E.I.5.

AN INVESTIGATION OF THE DEHYDRATION OF THE SUPERABSORBING POLYACRYLIC HYDROGELS

J. Jovanović¹, B. Adnadević², S. Ostojić³, M. Kićanović³, D. Uskoković¹

¹Institute of Technical Sciences of SASA, Belgrade, ²Faculty of Physical Chemistry, Belgrade,

³Institute of General and Physical Chemistry, Belgrade, Serbia and Montenegro

Hydrogels are three-dimensional cross-linked polymeric structures, which are able to swell in the aqueous environment. They are used extensively in medicine and pharmacy as drug delivery systems, contact lenses, wound dressing and biosensors. Using the original procedure samples of superabsorbing hydrogels based on cross-linked polyacrylic acid, having different cross-linking degrees, were synthesized. The equilibrium swelling degrees of the synthesized hydrogels samples in water were determined at 298 K. An existence of relationship of the equilibrium swelling degrees from the crosslink density of investigated hydrogels was determined. Dehydration kinetics of swollen hydrogels was investigated using non-isothermal kinetics method (TG and DSC methods). Basic kinetics parameters of the dehydration of the swollen hydrogels were determined: reaction order, pre-exponent factor, activation energy. It was conclude that increase in cross-linking degree lead to diminishing the activation energy and to increasing the pre-exponential factor. A possible mechanism of the dehydration of the investigated superabsorbing polyacrylic hydrogels was discussed.

Poster Presentation

P.S.A.1.

GELCASTING OF ALUMINA

Lj. Čerović¹, J. Filipović², I. Popović²

¹Vinča Institute of Nuclear Sciences, Belgrade,

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

Gelcasting is a novel forming method, appropriate for making high-quality complex-shaped ceramic parts. A high solid (up to 60 vol%) containing slurry of low viscosity was prepared by ball milling of alumina powder in aqueous solution of the reactive organic monomers, with an addition of the preselected dispersant. Slurry was poured into a mold, polymerized *in-situ* to immobilize the particles in a gelled part, removed from a mold, dried and fired. Different concentration ratio of monofunctional acrylamide, $C_2H_5CONH_2$, and difunctional, N,N'-methylenebisacrylamide, $(C_2H_5CONH)_2CH_2$, as a cross-linker, was applied to obtain an elastic hydrogel of sufficient strength to serve as a ceramic binder. Polymerization was initiated by the presence of ammonium persulfate, $(NH_4)_2S_2O_8$, and accelerated by potassium tiosulphate, $K_2S_2O_5$, as a catalyst, and/or heat. Shrinkage and density measurements of the gelcast body, containing less than 5 mass% of the polymer, were performed after the sintering.

P.S.A.2.

MICROWAVE PROCESS FOR THE PREPARATION OF THE SODIUM SILICATE POWDERS

B. Adnađević¹, J. Jovanović², S. Milenković¹

¹Faculty of Physical Chemistry, Belgrade,

²Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro

Crystalline (penta, nona) metasilicate and amorphous sodium silicate powders and agglomerates are well known builders for various detergent formulations. The ordinary processes for preparing alkali silicates in crystalline forms are crystallizations from supersaturated solutions, while the amorphous forms are obtained by drying of water solutions in the dryers Spray Drays types. A new process for preparing both crystal and amorphous forms of alkali silicate by interactions of microwave field with alkali silicate water solutions is developed. The influences of the water solutions composition, microwave power and the duration of the interactions on the structure of the obtained alkali silicate and its builder properties (velocity of the dissolution, buffer capacity and the ion exchange capacity) were determined. The builder properties of the powders obtained by microwave and by an ordinary process are compared. A significant improvement of the builder properties for the alkali silicate obtained by a microwave process is established.

P.S.A.3.

**SYNTHESIS OF $\text{LiMn}_{2-x}\text{Ni}_x\text{O}_4$ AND $\text{LiCo}_{1-x}\text{Ni}_x\text{O}_2$
BY GLYCINE-NITRATE METHOD**

N. Cvjetičanin¹, D. Jugović², M. Mitrić³, M. Miljković⁴, S. Mentus¹

¹Faculty of Physical Chemistry, University of Belgrade, Belgrade, ²Institute of Technical Sciences of SASA, Belgrade, ³Laboratory for Theoretical and Condensed Matter Physics, Institute of Nuclear Sciences "Vinča", Belgrade, ⁴Faculty of Medicine, Niš, Serbia and Montenegro

Cathode materials for lithium ion batteries are usually made through a time and energy consuming solid-state reaction. Synthesis procedures of these materials via solution enable better homogeneity and narrower particle size distribution, but may be complex or may demand special experimental equipment. In this study we used simple and rapid combustion method to synthesize complex oxides such as $\text{LiMn}_{2-x}\text{Ni}_x\text{O}_4$ and $\text{LiCo}_{1-x}\text{Ni}_x\text{O}_2$. Aqueous solutions of nitrates and glycine were heated in a covered glass beaker in an oven at 200°C until spontaneous ignition occurred. Resulting ash, without pressing, was heated at 800°C for 4 hours. For both precursor solutions very fine powders of well crystallized phase were obtained.

P.S.A.4.

**PROPERTIES OF LITHIUM MANGANATE POWDERS OBTAINED BY
ULTRASONIC SPRAY PYROLYSIS**

D. Jugović¹, M. Mitrić², N. Cvjetičanin³, M. Miljković⁴, V. Jokanović¹, S. Mentus³, D. Uskoković¹

¹Institute of Technical Sciences of SASA, Belgrade, ²Vinča Institute of Nuclear Sciences, Laboratory for Theoretical and Condensed Matter Physics, Belgrade, ³Faculty of Physical Chemistry, University of Belgrade, Belgrade, ⁴Faculty of Medicine, University of Niš, Serbia and Montenegro

LiMn_2O_4 powders were synthesized through ultrasonic spray pyrolysis. Aerosol was introduced in the horizontal electric furnace at the temperature of 1100 K. Resulting powders were collected in two different ways: slowly cooled to room temperature (SC) and quenched in water (Q). The crystal structure of the as prepared powders was revealed by X-ray powder diffraction (XRPD). Structure refinements confirm that SC sample crystallize in $\text{Fd}3\text{m}$ space group, while Q sample crystallize in $\text{I}4_1/\text{amd}$ space group. Annealed at 570K, Q sample transforms into spinel phase. Particle morphology was determined by scanning electron microscopy (SEM).

P.S.A.5.

INFLUENCE OF SEED GRAIN SIZE AND OXALIC ACID ON THE PARTICLE SIZE DISTRIBUTION OF $\text{Al}(\text{OH})_3$ CRYSTALS DURING THE DECOMPOSITION OF CAUSTIC SODA SOLUTIONS

I. Nikolić¹, D. Blečić¹, N. Blagojević¹, V. Radmilović², K. Kovačević³

¹University of Montenegro, Faculty of Metallurgy and Technology, Podgorica, ²University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, ³Institute for Ferrous Metallurgy, Nikšić, Serbia and Montenegro

One of the basic industrial requirements during the decomposition of caustic soda solutions is satisfactory grain size of precipitated $\text{Al}(\text{OH})_3$ that is good $\text{Al}(\text{OH})_3$ particles size distribution (PSD). It depends of mechanism of decomposition process, exactly of nucleation, agglomeration and crystal growth processes. These processes occur simultaneously during the decomposition process.

If the satisfactory grain size of precipitated $\text{Al}(\text{OH})_3$ be attained, decomposition process of caustic soda solutions would take place at the optimal values of parameters as the: temperature, caustic soda concentration, mass and grain size of seed.

Besides, presence of impurities (organic or inorganic) has a big influence on the mentioned processes that occurs during the decomposition of caustic soda solutions and also on the PSD.

In this paper we have investigated the influence of seed grain size and the presence of oxalic acid on the PSD of $\text{Al}(\text{OH})_3$ during the decomposition of caustic soda solutions at the different temperatures and caustic soda concentrations.

Obtained results have shown that if the seed grain size of $-32 \mu\text{m}$ used, the agglomeration process occurs, and if the seed grain size of $-75+63 \mu\text{m}$ used, the nucleation process occurs. Investigation of influence of temperature and caustic soda concentration have shown that agglomeration process is increased with increase of temperature and decrease of caustic soda concentration and in this case the bigger grain size of precipitated $\text{Al}(\text{OH})_3$ is obtained. On the other hand, nucleation process is increased with decrease of temperature and caustic soda concentration. The smaller grain size of precipitated $\text{Al}(\text{OH})_3$ than the seed grain size is obtained in this case.

Both processes of agglomeration and nucleation take place more intensive in the presence of oxalic acid than in the case of decomposition of pure caustic soda solutions.

P.S.A.6.

PREPARING OF STRONTIUM-FERITE FROM COMPLEX COMPOUNDS WITH ACETYLACETONATO LIGANDS

A.S. Nikolić¹, J.M. Puzović², P. Osmokrović³, T.J. Sabo¹, M.S. Stojanović¹, M.B. Pavlović⁴

¹Faculty of Chemistry, Belgrade, ²Faculty of Physics, Belgrade, ³Faculty of Electrical Engineering, Belgrade, ⁴Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro

The conditions for preparing of ultra fine powders of strontium ferrite were investigated. For the first time, we used method, based on thermal decomposition of complex compounds with acetylacetonato ligands. This method was originally developed for preparation of "soft" ferrite materials (cubic crystal structure). We used this method, and prepared ultra fine "hard" ferrite materials (hexagonal crystal structure). X-ray analysis shows that obtained material has very high feritization ratio. SEM analysis shows that the particle size was ultra fine (less than 200 nm).

P.S.A.7.

NICOLSON-ROSS ANALYSIS OF ABSORPTION COEFFICIENTS OF NICKEL AND NICKEL-ZINC FERRITE POWDERS PREPARED BY DIFFERENT METHODS

A.S. Nikolić¹, V. Likar-Smiljanić², Č. Jovalekić³, T. Čajkovski⁴, R. Biljić², D. Manojlović¹, M.B. Pavlović⁴

¹Faculty of Chemistry, Belgrade, ²Faculty of Electrical Engineering, Belgrade, ³Center for Multidisciplinary Studies, Belgrade, ⁴Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

Nickel and nickel-zinc ferrites are ones of most abundant members of the soft magnetic materials. In the last few years, interest for new methods for preparation of them increase, because that it is well known that the physical and chemical properties of these materials strongly depend on the preparing conditions.

Powder samples of soft ferrites of NiFe_2O_4 and $\text{Ni}_x\text{Zn}_{1-x}\text{Fe}_2\text{O}_4$ were synthesized by classic sintering procedure, planetary- and vibro- mill synthesis procedure and by chemical procedure from complex compounds with acetylacetonato- ligands. Average particle size were 1 μm , 40 nm, 25 nm and 20x20x4 nm (slabs) respectively. All obtained materials were measured in the frequency range of 6-13 GHz for real and imaginary part of dielectric constants, coefficients of susceptibility and absorption coefficients were calculated. Concurrent analysis of obtained values showed that the method of synthesis as well as particle size influence absorption coefficients in applied frequency range.

P.S.A.8.

THERMAL AND CONDUCTIVE INVESTIGATIONS OF ALKALINE EARTH SALTS OF 12-TUNGSTOPHOSPHORIC ACID

Z.P. Nedić¹, U.B. Mioč¹, M. Todorović², D. Arandelović³, M. Odović¹

¹Faculty of Physical Chemistry, Belgrade, ²Faculty of Chemistry, Belgrade, ³Institute of General and Physical Chemistry, Belgrade, Serbia and Montenegro

Heteropoly compounds usually formed a few different crystallohydrates. Their stability depends on ambiental temperature and relative humidity. Therefore we have investigated 12-tungstophosphoric acid (WPA) alkaline earth salts under constant conditions of relative humidity (35%) and room temperature (20⁰C). Under these conditions hydration degree and the phase transformation were followed by methods of thermal analyses (TGA, DTA). From obtained results it is evident that dehydration process is influenced by cations nature. The electric measurements have implied that conductivity of investigated salts vary on hydration degree and cation nature too.

P.S.A.9.

RAMAN AND INFRARED SPECTROSCOPY OF EARTH ALKALINE SALTS OF 12-TUNGSTOPHOSPHORIC ACID

S. Uskoković-Marković¹, Ph. Colombar², U.B. Mioč³, M.R. Todorović⁴

¹Faculty of Pharmacy, Belgrade, ²Laboratoire de Dynamique Interaction et Reactivité, CNRS, Thiais, France, ³Faculty of Physical Chemistry, Belgrade, ⁴Faculty of Chemistry, Belgrade, Serbia and Montenegro

High conductivity of some heteropoly compounds of Keggin type, such as 12-tungstophosphoric acid (WPA) and its salts, classified them as superionic protonic conductors at room temperature.

In this communication the results of Raman and IR spectroscopy investigation of earth alkaline WPA salts are presented (the salts with different hydration degree, as well as some deuterized samples).

Spectral data show that structural changes are much influenced by cation nature. Influence of cation is evident on the protonic species, and also on the host lattice.

P.S.A.10.

**SCREEN PRINTED $\text{BaTi}_{1-x}\text{Sn}_x\text{O}_3$ FUNCTIONALLY GRADIENT MATERIALS:
PREPARATION AND PROPERTIES**

S. Marković¹, V. Pejović², M. Mitrić³, N. Cvjetičanin⁴, M. Miljković⁵, D. Uskoković¹

¹Institute of Technical Science of SASA, Belgrade, ²d.d. IRITEL, Belgrade, ³Vinča Institute of Nuclear Sciences, Belgrade, ⁴Faculty of Physical Chemistry, Belgrade, ⁵Laboratory for Electron Microscopy, Niš, Serbia and Montenegro

In this paper, we report the results of preparation and properties of $\text{BaTi}_{1-x}\text{Sn}_x\text{O}_3$ ($x=0.025, 0.05, 0.075, 0.1, 0.125$ and 0.15) functionally gradient materials obtained by screen-printing. The BTS powders were prepared using the commercial powders BaTiO_3 , SnO_2 and BaCO_3 . The BTS thick films were screen printed on alumina substrates electroded with Ag/Pd. The samples were sintered at 850°C for 10 minutes. After sintering, the thickness was $50\text{--}160\ \mu\text{m}$, depending on number of layers. The starting powders were characterized by XRPD method. The microstructure of thick films and the compatibility between BTS layers and substrate was investigated by SEM and EDX methods. The dielectric properties of FGM were measured, too.

P.S.A.11.

MECHANICAL SYNTHESIS OF CaTiO_3 FROM CaCO_3 - TiO_2 MIXTURE

V. M. Vukotić, T. V. Srećković, Z. V. Marinković

Center for Multidisciplinary studies, University of Belgrade, Belgrade, Serbia and Montenegro

The structure of calcium titanate, CaTiO_3 , was performed by mechanical activation and thermal treatment. Equimolar mixture of CaCO_3 and TiO_2 powders was mechanically activated by milling for up to 360 minutes in a planetary ball mill. A small amount of mechanically activated mixtures was pressed into briquettes and calcinated at 850°C for two hours. The effect of mechanical activation on the solid state reaction was followed using X-ray powder diffraction and differential thermal analysis. Scanning electron microscopy was employed to probe the sample microstructure. The sintering process was followed by sensitive dilatometer during nonisothermal thermal treatment up to 1300°C with various heating rate. The main conclusion of the analysis is that CaTiO_3 ceramics could be obtained from activated mixture at a much lower temperature than reported in the literature owing to the acceleration of the chemical reaction and sintering.

P.S.A.12.

**MECHANOCHEMICAL ACTIVATION IN SYNTHESIS OF $\text{LaTi}_{0.5}\text{Mg}_{0.5-x}\text{Pd}_x\text{O}_3$
($0 < x < 0.1$) PEROVSKITE**

S. Petrović¹, Lj. Karanović², M. Zdujić³, P. Kirilov-Stefanov⁴, A. Terlecki-Baričević¹

¹ChTM-Department of Catalysis and Chemical Engineering, Belgrade, ²Laboratory of Crystallography, Faculty of Mining and Geology, Belgrade, ³Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro, ⁴Institute of General and Inorganic Chemistry, BAN, Sofia, Bulgaria

A mechanochemical activation of binary mixtures of oxides $\text{TiO}_2\text{-MgO}$, $\text{La}_2\text{O}_3\text{-MgO}$, $\text{La}_2\text{O}_3\text{-TiO}_2$ in the ratio 1:1, $\text{MgO-PdOxH}_2\text{O}$ in the ratio 1:0.05, as well as a ternary mixture $\text{La}_2\text{O}_3\text{-MgO-TiO}_2$ in the ratio 1:0.5:0.5 that corresponds to the normal perovskite stoichiometry, was performed using high-energy ball milling in an air atmosphere. The mixtures were milled for 1 h in steel milling medium. The phase compositions are characterized by X-ray powder diffraction technique and surface state of ions were followed using X-ray photoelectron spectroscopy. Perovskite phase was formed in all TiO_2 -containing mixtures. XPS show that mechanochemical activation leads to the shift in binding energy of Mg^{2+} to the significantly lower values. The results provided insights into the transformation processes that occur in these mixed oxides during the mechanochemical activation.

P.S.A.13.

**ENHANCING SYNTHESIS AND SINTERING OF ZINC TITANATE USING
MECHANICAL ACTIVATION**

T. Srećković¹, N. Obradović², N. Labus², Z. Marinković¹, M. M. Ristić³

¹Center for Multidisciplinary Studies, University of Belgrade, Belgrade, ²Institute of Technical Sciences of SASA, Belgrade, ³Serbian Academy of Sciences and Arts, Belgrade, Serbia and Montenegro

Mechanical method of the activation of chemical and sintering process is used for obtaining of zinc titanate, Zn_2TiO_4 . Starting powder mixtures of ZnO and TiO_2 in the molar ratio in accordance with stoichiometrics of zinc titanate, inverse spinel Zn_2TiO_4 , were mechanically activated by grinding in a planetary mill for 0-180 minutes, calcinated at 900 degrees Celsius for two hours, and then sintered at 1100 degrees Celsius for two hours. The progress of the solid-state reaction between starting powders and evolution of the phase composition were followed using X-ray diffraction and differential thermal analysis. Sintering process was followed by sensitive dilatometer. The main conclusion of the analysis is that Zn_2TiO_4 ceramics could be obtained for certain time of activation at much lower temperature that reported in literature with acceleration of the chemical reaction and sintering.

P.S.A.14.

SINTERING OF MECHANOCHEMICAL ACTIVATED HYDRATED ALUMOSILICATE

D. Živanović

Institute for Mineral and Nuclear Technologies, Belgrade, Serbia and Montenegro

In this paper are presented investigation of kinetic and mechanism of mechanochemical activation of natural silicates of aluminium as well as influence of mechanochemical activation on process of sintering and changes of properties of material. Time of mechanochemical activation was 10-120min. Temperature field of sintering was 800-1000C. We concluded after mechanical activation and sintering is formed new compound anortit. As well as rising of density and porosity, mechanical strength are rising after sintering of mechanically activated material.

P.S.A.15.

METAL-INDUCED CRYSTALLIZATION OF POLYCRYSTALLINE SILICON BY IN-SITU EXCIMER LASER ANNEALING DURING LOW- PRESSURE CVD GROWTH

S. Loreti¹, A. Santoni¹, J. Lancok², I. Menicucci¹, C. Minarini³, D. Della Sala⁴

¹ ENEA-Frascati, Frascati Italy, ² Academy of Science, Institute of Physics, Prague, Czech Republic, ³ ENEA-Portici, Portici, Italy, ⁴ ENEA-Casaccia, S. Maria di Galeria, Italy

Polycrystalline silicon films were grown from Si_2H_6 by Low-Pressure Chemical Vapour Deposition (LPCVD) at 800K and in-situ laser annealing on amorphous silicon seed layers deposited on different metallic films. The crystalline volume fraction in the seed layer was controlled by thermal annealing. According to the Metal Induced Crystallization effect, the presence of the metal induces a lower-temperature crystallization of silicon in the seed layers. The influence of different metals on the obtained morphologies and crystalline phases were investigated by X-ray diffraction and Scanning Electron Microscopy. The experimental results show that the film morphology depends strongly on the seed layer microstructure and laser annealing parameters.

P.S.A.16.

WATER ELECTROLYSIS ON PLATINUM CATALYSED CARBON POWDERS

B. Šljukić, N. Vukelić, S. Mentus

Faculty of Physical Chemistry, Belgrade University, Belgrade, Serbia and Montenegro

Carbon powder coated with finely dispersed platinum catalysts is nowadays widely used electrode material in room temperature fuel cells. In this work, from the aspect of water electrolysis, we compared the two Pt-catalysed carbon powders: commercial one (the commercial name Vulcan), and a home synthesized powdered glassy carbon doped with nickel. The synthesis of metal doped porous glassy carbon was published elsewhere¹. Platinum catalyst was applied on carbon powders by thermal decomposition of chlorplatinic acid. Some higher rate of both hydrogen and oxygen evolution from a slightly acidic solution of 1 M Na₂SO₄ was observed on home made Ni-doped carbon powder than on commercial one. The evolution rates on both carbon powders are higher than the ones observed on smooth platinum electrode. It was found also that the home synthesized Ni-doped glassy carbon powder itself displays a notable catalytic effect to oxygen evolution reaction.

P.S.A.17.

**THE EFFECTS OF RC ON THE PROPERTIES OF COPPER POWDER PARTICLES
AND PROPERTIES OF ELECTROLYTIC COPPER POWDER
I. THE MORPHOLOGY OF PARTICLES**

M.G. Pavlović¹, K.I. Popov², L.J.J. Pavlović¹, E.R. Ivanović³

¹ICTM-Department of Electrochemistry, Belgrade

²Faculty of Technology and Metallurgy, University of Belgrade, Belgrade

³Faculty of Agriculture, University of Belgrade, Zemun, Serbia and Montenegro

The possibility of depositing copper powders with different apparent density by changing the shape of reversing current wave will be shown. The morphology and crystallinity of powder particles, as well as the apparent density of powders can be varied considerably by changing shape of the reversing current wave. It was concluded that increase of compactness of the powder particles increases the apparent density of copper powder. In the case of reversing current regime the particles are less dendritic and less agglomerated than the ones obtained in the case of constant current regime. This is explained by slower growth rate, lower diffusion control and the selective dissolution of the dendrite branches caused by different radii of curvature, because of the influence of surface energy on the reaction velocity during anodic process, which leads to formation of more massive copper powder particles i.e. powders of greater apparent density.

The selective dissolution of dendrite tips very much depends on time of anodic dissolution. In the minute range, dendrite tips dissolve very fast to the dimension when the selective dissolution stops and the particle starts to dissolve uniformly. In the second range, the powder particles are agglomerates of monocrystal subparticles. The effect of decreased dissolution time from the minute to the second range is the same as in the case of the particles in "macrolevel", while the effect the selective dissolution of the particles on the "microlevel", results in the formation of regular crystal forms.

The relation of apparent density with particle morphology and structure will be illustrated.

P.S.A.18.

**THE EFFECTS OF RC ON THE PROPERTIES OF COPPER POWDER PARTICLES
AND PROPERTIES OF ELECTROLYTIC COPPER POWDER
II. THE APPARENT DENSITY AND FLOWABILITY OF POWDER**

K.I. Popov¹, M.G. Pavlović², L.J.J. Pavlović², V.M. Maksimović³, E.R. Ivanović⁴

¹Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, ²ICTM-Department of Electrochemistry, Belgrade, ³Vinča Institute of Nuclear Sciences, Belgrade, ⁴Faculty of Agriculture, University of Belgrade, Zemun, Serbia and Montenegro

The morphology and crystallinity of powder particles can be varied considerably by changing shape of the reversing current wave and the apparent density of powders. On the other hand, the flowability of copper powder depends on the interparticle friction, which is dominated by the surface area and surface roughness of the particles. As the surface area and surface roughness increase, the amount of friction in a powder mass increases and the powder exhibits less efficient flow. The same appears with the shape of particle. The more irregular the particles shape, the less efficient powder flow. Resistance to flow is a main feature of friction, which decreases as the particles approach a smooth spherical shape. The effect of particle size distribution on the powder flowability is also important. If the powder consists of monosized particles, which are more or less in point contact with one another, making the contact surface as low as possible, even dendritic deposits can flow. If powder consists of the different particles, the interstitial voids of larger particles can be filled by the lower ones, the contact surface area increases, and the flow of the powder is less efficient. Because of this, the nonsieved powder often does not flow, while the fractions of the same powder flow. Hence, the best conditions for the powder free flow are fulfilled if the powder consists of the monosized particles of the spherical shape with a surface structure approaching the structure of smooth metal surface.

In this paper, the analysis of the effects of the shape, surface structure and size distribution on the flowability of the copper powder is performed also. It will be shown that the most important property of the particles of powder, relative the flowability of the powder, is the surface structure of the particles.

P.S.A.19.

THE EFFECT OF THE ELECTROLYSIS PARAMETERS ON THE OBTAINED COBALT AND NICKEL POWDER PROPERTIES

M. Spasojević¹, A. Maričić², L. Rafailović¹, B. Jordović²

¹Faculty of Agronomy, Čačak, University of Kragujevac,

²Technical Faculty, Čačak, University of Kragujevac, Serbia and Montenegro

Amorphous Co and Ni alloy powders were obtained by electrochemical deposition from ammonium solution of cobalt and nickel sulfate. Powders of specific chemical structure and composition, particle shape and size were obtained by an appropriate choice of the electrolysis parameters, current density, deposit growth rate and solution temperature and composition. Within the current density range of 200 to 400 mAcm⁻², current density did not significantly affect the chemical composition of the powders, but had a significant effect on the particle structure, shape and size. Powders of lower apparent density with smaller more dendritic particles and more developed and higher-order branches were formed at higher current densities. Structural changes of the obtained amorphous powder of Ni 55,5-Co 44,5 mass percent, pressed under pressure of 100 MPa, were investigated by measuring the temperature dependence of electrical resistance in isothermal and non-isothermal conditions varying from room temperature to 1000K. The process of thermic stabilization of defects that appeared during pressing occurred within the temperature range 570-770 K. The amorphous powder crystallization process occurred at two stages, the first one ranging from 820 to 900 K, and the second one varying from 900 to 1000K. Electrical resistance suddenly decreased during the crystallization due to an increase of electron mean free path and electron density state at the Fermi level. At subsequent heating of the same sample, following crystallization, at a temperature range of room temperature to 1000 K, a constant value of temperature resistance coefficient was obtained. Kinetic crystallization parameters were determined based on the results obtained by measuring the electrical resistance change over time at different temperatures (T₁= 800K, T₂= 820K, T₃= 840K).

P.S.A.20.

**KINETICS OF HYDROGEN ABSORPTION AND HYDROGEN DESORPTION OF
THE POWDER Ni_{55.5}Co_{44.5}**

A. Maričić, V. Milovanović, R. Simeunović, B. Jordović
Technical Faculty, Čačak, Serbia and Montenegro

Kinetic parameters of absorption and desorption of hydrogen in the above described conditions were determined by measuring the change of electrical resistivity in time under isothermal conditions at temperatures $T_1 = 413\text{K}$, $T_2 = 443\text{K}$ i $T_3 = 463\text{K}$. Decrease of electrical resistivity of the alloy powder, caused by absorption of hydrogen, considerably depends on temperature and duration of the absorption process. During the first: 120 seconds at temperature T_1 , 100 seconds at temperature T_2 and 75 seconds at temperature T_3 linear dependence of $\ln R$ vs. time τ is determined. During the time intervals: $120\text{s} < \tau < 250\text{s}$ at temperature T_1 , $100\text{s} < \tau < 175\text{s}$ at temperature T_2 and $75\text{s} < \tau < 150\text{s}$ at temperature T_3 linear dependence of R vs. $\tau^{1/2}$ is obtained. Constants of the absorption rate of hydrogen for T_1 , T_2 and T_3 are determined from the slopes of straight lines $\ln R = f(\tau)$ and $R = f(\tau^{1/2})$, by using following relations $\Delta \ln R / \Delta \tau$ and $\Delta R / \Delta \tau^{1/2}$. After the process of absorption of hydrogen into the alloy powder was finished, the atmosphere in the chamber was changed and hydrogen gas was replaced by argon gas. Then, increase in the electrical resistivity in the process of hydrogen desorption was measured at the same temperatures as in the case of absorption of hydrogen. The same linear dependences are obtained for the process of desorption as those characteristic for the absorption. Therefore, the same procedure is used to calculate constants of the rate of hydrogen desorption at the temperatures T_1 , T_2 and T_3 .

P.S.A.21.

HYDROGEN ABSORPTION AND DESORPTION KINETICS IN NICKEL AND COBALT ALLOY POWDER

A. Maričić¹, M. Spasojević², V. Milovanović¹, L. Rafailović²

¹Technical Faculty, Čačak, University of Kragujevac,

²Faculty of Agronomy, Čačak, University of Kragujevac, Serbia and Montenegro

Amorphous Co and Ni alloy powders of specific granulometric and chemical composition (55mol.%Ni, 45mol.%Co) were obtained by electrochemical deposition from ammonium solution of cobalt and nickel sulfate. Temperature interval of hydrogen absorption in the nickel and cobalt alloy powder was determined by measuring the decrease of hydrogen pressure in chamber with the alloy powder. It was established that hydrogen was absorbed in the powder at temperatures below 525 K. At temperatures below 300 K, the absorption did not practically occur due to kinetic restriction. Hydrogen absorbed at a temperature range of 300 to 525 K remained in the powder even after cooling at temperatures below 300 K.

Kinetic parameters of hydrogen absorption and desorption of pressed powder samples were determined based on results obtained by measuring time dependence of a decrease of electrical resistance during absorption of hydrogen at different temperatures. Hydrogen absorption and desorption occurred in two steps, for which activation energies were determined.

P.S.A.22.

CHARACTERISTICS OF ELECTROCHEMICALLY OBTAINED AMORPHOUS IRON AND TUNGSTEN POWDERS

A. Maričić¹, M. Spasojević², D. Minić³, L. Ribić-Zelenović²

¹Technical Faculty, Čačak, University of Kragujevac,

²Faculty of Agronomy, Čačak, University of Kragujevac,

³Faculty of Physical Chemistry, Belgrade, University of Belgrade, Serbia and Montenegro

Amorphous Fe and W alloy powders of specific chemical structure and composition, particle shape and size were obtained by an appropriate choice of the electrolysis parameters, current density, deposit growth rate and solution temperature and composition. Amorphous structure was formed at a current density of $j = 400 \text{ Am}^{-2}$, with the molar ratio of W in the solution $n_w / n_w + n_{Fe} > 0,6$. With increasing current densities and molar ratio of W in the solution, the content of W in the powder increased. Smaller and more dendritic particles with more developed secondary and higher-order branches were formed at higher current densities. Powder with more dendritic particles had a lower apparent density.

Structural changes of the obtained amorphous powders, pressed under pressure of 100 MPa, were investigated by measuring the temperature dependence of electrical resistance in isothermal and non-isothermal conditions ranging from 290 to 1300 K. The temperature resistance coefficient of the amorphous Fe-W alloy with 22 mol% W did not change until 1050 K. At temperatures $t > 1050\text{K}$, there was a sudden decrease in electrical resistance due to the transformation of amorphous structure into a crystal one. During this transformation, electron mean free path and electron density of state at the Fermi level increased.

At subsequent heating of the same sample, following crystallization, at a temperature range of room temperature to 1300 K, a constant and somewhat higher value of temperature resistance coefficient was obtained.

P.S.A.23.

MICROABRASION METHOD FOR THICKNESS DETERMINATION OF PLASMA NITRIDED LAYER

D. Mikičić¹, A. Kunosić¹, M. Zlatanović¹, Ž. Đurišić¹, Z. Karastojković²

¹Faculty of Electrical Engineering, Belgrade, ²Polytechnic Academy, New Belgrade, Serbia and Montenegro

Calo-test method of microabrasion has been usually used for thickness measurement of thin, compact and clearly distinctive surface layers in hard coatings area. Authors developed application of this technique to measuring thickness of visually not distinctive layers in plasma nitriding. Samples made of various steel grades were plasma nitrided and then calo-tested. Chemical process was applied to visualize structure of different layers on abraded places. Observed relations of layers color and structure were steel grade dependent. Possibility was confirmed to determine the thickness of compound nitrided layer within 5% accuracy by measuring rings radii of visualized layer cross-section in the calo-test trace.

P.S.A.24.

**IN SITU OPTICAL MEASUREMENT OF TiN THIN FILM GROTH AND
CORRELATION WITH RBS ANALYSIS**

N. Popović¹, Ž. Bogdanov¹, B. Gončić¹, S. Zec¹, M. Zlatanović², D. Peruško¹

¹Vinča Institute of Nuclear Sciences, Belgrade, ²Faculty of Electrical Engineering, Belgrade,
Serbia and Montenegro

The TiN thin films were deposited by ion assisted ion beam sputter deposition from a single argon ion source. The films were deposited on glass and Si substrates at ambient temperature with thickness of about 500nm. The growth of TiN thin film was controlled in situ by means of visible light dependent resistor (LDR) placed on the rear side of the glass substrate. The increase of sensor resistance as a function of deposition time resulted from the thickening of TiN deposit. The result shows that for the different films after different characteristics time interval the curve slopes coincidence, indicating similar growth characteristics of TiN thin films. The beginnings of films growths were characterized by change in curve slope induced by the variation in argon ion energy (1.3-2keV). The RBS analysis shows that before characteristics time interval the amount of oxygen and argon incorporation in TiN films determine the change in curve slope. After characteristics time interval the growth of stoichiometric TiN film proceed for all investigated samples.

P.S.A.25.

**METHOD FOR DETERMINING NONHOMOGENEOUS OF OPTICAL
TRANSMITTANCE MATERIALS**

V. Zarubica, V. Skerović, P. Vukadin, A. Nikolić

Bureau of Measures and Precious Metals, Belgrade, Serbia and Montenegro

In this paper, method for determination nonhomogeneity of optically transmitting materials, which is realized at the Laboratory for Photometry and Radiometry of Bureau of measures and precious metals, is presented. This method is developed for the purpose of characterization of standard spectrophotometric filters. Results of measurement made on standard spectrophotometric optically neutral filters are shown, so as the estimation of measurement uncertainty.

P.S.A.26.

DSC INVESTIGATION OF HIGH-COPPER AlCuMg ALLOYS

B. Zlatičanin¹, B. Radonjić¹, Z. Marinković²

¹University of Montenegro, Faculty of Metallurgy and Technology, Podgorica

²CMS – Belgrade, University of Belgrade, Belgrade, Serbia and Montenegro

In this paper, the effects of copper and magnesium contents on the microstructure of AlCuMg alloys were examined. Early stages of transformation of a metastable AlCuMg alloy have been studied by DSC, X-ray powder diffraction method and by electron microsonde. Differential scanning calorimetry has been done for samples: AlCu5Mg2, AlCu5Mg4, AlCu15Mg2 and AlCu15Mg4. This method has produced DSC-curve, where two endothermal effects are present, on the basis of which next parameters have been calculated: heat of transition. With increasing the copper and magnesium content in the alloy the value of heat of transition is decreased. The formation of intermetallic compounds Al₂Cu and Al₂CuMg is monitored by the application of X-ray powder diffraction method. Through this method it has been found out that for alloy AlCu15Mg2 a tetragonal Al₂Cu with parameters of a crystal lattice: $a = 6,074 \text{ \AA}$, $c = 4,870 \text{ \AA}$, $V = 180,4 \text{ \AA}^3$ is formed and for alloys: AlCu5Mg2, AlCu5Mg4 and AlCu15Mg4 orthorhombic intermetallic compound Al₂CuMg with the lattice parameters: $a = 3,993 \text{ \AA}$, $b = 9,210 \text{ \AA}$, $c = 7,129 \text{ \AA}$ and $V = 262,16 \text{ \AA}^3$ are formed.

P.S.A.27.

CHARACTERIZATION OF MICROSTRUCTURE AND PROPERTIES OF AlCuMg ALLOYS

B. Zlatičanin¹, B. Radonjić¹, Z. Marinković², S. Đurić³, B. Jordović⁴

¹University of Montenegro, Faculty of Metallurgy and Technology, Podgorica

²CMS – Belgrade, Belgrade, ³Faculty of Mining and Geology, Belgrade

⁴Faculty of Technical Sciences, Čačak, Serbia and Montenegro

The effect of magnesium content, in the interval range from 1% to 5%, on the microstructure and properties of AlCuMg alloys was examined. Characterization of AlCuMg alloys: AlCu15Mg1 (0%Ti), AlCu15Mg1 (0.25%Ti), AlCu15Mg3 (0%Ti), AlCu15Mg3 (0.25%Ti), AlCu15Mg5 (0%Ti), AlCu15Mg5 (0.25%Ti) have been done by quantitative microstructure analysis, DSC, X-ray powder diffraction method, hardness, compression strength and by electron microscope. The effect of the magnesium content on the microstructure was monitored quantitatively. Using automatic image analysis we were able to measure the linear intercept grain size, the secondary dendrite arm spacing (DAS), the size of eutectic cells (Le), as well as the size distribution and volume fractions of the α -solid solution and the eutectic. In alloys containing high magnesium the average values of the DAS and grain size were found to decrease. Using X-ray powder diffraction we established that the tetragonal intermetallic compound Al₂Cu and orthorhombic intermetallic compound Al₂CuMg are formed across the whole range of magnesium additions.

P.S.A.28.

WEAR RESISTANCE OF LOW ALLOYED AUSTEMPERED DUCTILE IRON

B. Bošnjak¹, B. Radulović¹, B. Verlinden²

¹Faculty of Metallurgy and Technology, University of Montenegro, Serbia and Montenegro,

²Catholic University of Leuven, Belgium

Low alloyed austempered ductile irons samples were prepared at austempering temperature 300, 350 and 400°. Sliding wear tests was performed in a pin-on-disc wear tester with the test materials rubbing under dry atmospheric condition against a surface hardened steel disc at speeds 0.6, 0.7 and 1/0 m/s. A normal load of 15.82 and 22.84 N was applied to press test pins against rotating counter body. The sliding dry wear behavior of austempered ductile iron was studied under applied conditions. The results obtained showed that the wear resistance is slight dependent of austempering temperature with low applied load, but shows a strong dependence on austempering temperature at high applied load.

Both the light and scanning electron microscopy examine specimens. The structure consisted of bainitic ferrite and retained austenite. The volume fraction of austenite and carbon content of austenite has been evaluated by X-ray diffraction.

The volume fraction of retained austenite, bainitic ferrite, untransformed austenite and austenite carbon content was correlated with microstructural and mechanical properties. Optimum properties are obtained at austempering periods (60-120min) when both the amount of retained austenite and austenite carbon content is maximum.

P.S.A.29.

**THE DEPENDANCE OF THE SEN INTERNAL EROSION AND THE
CONCENTRATION OF Al, Si AND Ca IN THE SEN WALL ON THE CONTINUOUS
STEEL CASTING**

S. Dević¹, V. Jokanović², M. Logar³

¹Institute for Metallurgy, Smederevo, ²Institute of Technical Sciences of SASA, Belgrade,

³Faculty of Mining and Geology, Belgrade, Serbia and Montenegro

In this paper are given causes of the scab formation in the inner SEN wall. Examining the SEN wall on the basis of alumographite by the X-Ray fluorescent spectrometry method (this being done after the continuous steelcasting process) the change in concentration of Al, Si and Ca in the SEN of one series has been perceived.

The measurement results of the SEN wall thickness, regardless of the scab thickness, have shown the decrease in the SEN wall thickness one to the internal erosion and the change in concentration of Al, Si and Ca in the contact zone of the wall (contact SEN/steel) in comparison to the concentration of the same elements in the rest of the wall. The increase the concentration of Al and Si in the contact zone of the wall in comparison to the concentration in the rest of the wall, are the result of the diffusion which had been taking place in the material of the SEN wall directed to the steel. Simultanocously, the concentration of Ca in the contact zone of the SEN wall is smaller than the concentration of Ca in the rest of the wall.

The examination results have shown that with the increase of the internal erosion of SEN increases the concentration of Al and Si and the concentration of Ca in the contact zone of the SEN wall decreases. The significance of these dependancies also confirms the high values of correlation indexes. The drop of the Ca concentration in the contact zone of the SEN wall can be explained by the increase of the Ca content component in the scab. Namely, with the increase of the internal erosion of SEN, the concentration of Ca in the contact zone of the SEN wall decreases, but the content of CaO in the SEN scab increases. In the same time, the concentration change and diffusion are not registered in the SEN wall of other series. The wall thickness of these nozzles has remained unchanged, which confirms that the internal erosion never took place.

P.S.A.30.

THE INFLUENCE OF THE COMPOSITION CHANGE OF ORGANIC SPREADING COATINGS ON THEIR PROPERTIES

B. Jović¹, T. Petrović², Č. Lačnjevac³, Lj. Gajić-Krstajić⁴

¹CMS, University of Belgrade, ²Zorka-boje, Šabac, ³IMS Institute,

⁴Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro

The basic component of the spreading coatings is the binder, solvent and pigment. In addition to these basic components the spreading coatings also contain plastifier, diluent, filler, siccative and aid agents.

The most important component of spreading coating determining the properties of the formed coating is the binder. The most widely used binders for obtaining the organic spreading coatings are on the basis of plant oils, natural and artificial resins and bitumen.

The paper deals with the examination of the changes of the characteristics of the alkyd spreading coatings depending on the application of the alkyd resins. Alkyd resins used for obtaining the spreading coatings are modified by oil acids, alcohols or acids. Likewise the kinds and the amounts of the component entering into the composition of alkyd resins have also been varied. Using the obtained alkyd spreading coatings the following characteristics have been examined; for hardness and wear resistance, resilience; stretching and adhesion corrosion stability. Besides, the examination of the effects of the climate conditions on the formed coating has been carried out (temperature, relative humidity, UV-radiation) and the examination of the protective properties by means of electrochemical methods.

The results obtained by these examinations gave certain correlations between the applied alkyd resins and the characteristics of the formed coating film.

P.S.A.31.

MICROWAVE ASSISTED POLYMERIZATION OF DIMETHYL ITACONATE

S. J. Veličković¹, I. G. Popović¹, J. Jovanović², B. Adnadević³

¹Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, ²Institute of Technical Sciences of SASA, Belgrade, ³Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro

The microwave assisted radical polymerization of dimethyl itaconate is presented in this paper. This type of polymerization has shown good results with methacrylic polymers, while there have not been investigations reported in the field of polyitaconates. In this investigation the polymers were synthesized in bulk using 1 %mol AIBN as the initiator, using glass ampoules sealed under nitrogen atmosphere. Polymerizations were carried out in a homogeneous microwave field of 2.45 GHz frequency with input powers from 300W to 800 W and polymerization times from 5 to 60 minutes. The results have shown that the increase of microwave power does not significantly influence the yields while the increase of the polymerization times resulted in increased yields. The products were purified and investigated using SEC and FTIR methods. The obtained results showed that polymers prepared by this procedure have properties similar to polymers synthesized by standard thermal polymerizations. Therefore, this process can represent an important advancement in the production of polyitaconates, because of the significant reduction of polymerization times.

P.S.A.32.

**SYNTHESIS OF THE 4-VINYLPYRIDINE COPOLYMERS WITH STIREN,
METYLACRILAT AND METHYLMETHACRYLAT, AND THEIR APPLY FOR THE
ADSORPTION OF GOLD**

P. Miletić¹, S. Jovanović², V. Bojanić³, M. G. Pavlović⁴, Z. Topić³, M. Dragić⁵

¹Forestry Faculty, Banjaluka, ²Faculty of Technology and Metallurgy, Belgrade

³Faculty of Agriculture, Banjaluka, ⁴ICMT-Department of Electrochemistry, Belgrade, Serbia
and Montenegro, ⁵MUP RS, Department for Crimetechnics, Banjaluka, Serbian Republic,
Bosnia and Herzegovina

During this work the meshed copolymers on the basis of 4-vinylpyridine have been synthesized with stiren, metylacrylate and metylmethacrylate, and meshing process has been performed by using divinylbenzene: poly-4-vinylpyridinecopolymer-stiren-copolymer-metylarylate (poly (4-VP-co-St-co-MA)) and poly-4-vinylpyridinecopolymer-stiren-copolymer-methylmethacrylat (poly(4-VP-co-St-co-MMA)). In this work are showed the results obtained during the study work of synthesized copolymers as ion-exchange resins for adsorption of gold from diluted solutions have been presented. Suspension copolymerisation of 4-vinylpyridine and monomers has been made by using suspension substance polyvinyl-alcohol and azobisisobutyronitrile serving as initiator, and meshing has been achieved using divinylbenzene. Suspension copolymerisation had the temperature regime as follows: the substances in the reaction were to be heated until the temperature of 40°C was reached, then the temperature was elevated at 70°C, and finally, reaction finished at 90°C. Mixing regime was as much adjusted as that it ranged from 150-200 revolutions a minute. Composed meshed copolymers on the basis of 4-vinylpiridine had a round shape and high percentage of consumption, on the basis of 4-vinylpiridine had a round shape and high percentage of consumption, calculated on the basis of 4-vinylpiridine (approx. 95 mass%). Chemical structure of synthesized copolymers was proved by IR-spectroscopy, which showed the appearance of the characteristic band. Quantity of the adsorpted gold in the copolymers has been proved by using methodes of gravimetry and spectrofotometry. Gold has been separated from its diluted water-sollutions by copolymers. These copolymers separated the following quantity of gold: poly (4-VP-co-St-co-MA) 0,784 g Au/g copolymer and poly(4-VP-co-St-co-MMA) 0,675 g Au/g copolymer.

P.S.A.33.

**INFLUENCE OF DIFFERENT FILLERS ON MECHANICAL PROPERTIES OF NR /
SBR ELASTOMER COMPOSITES**

B. Čubrić¹, I. Pajić-Lijaković¹, R.S. Popović², B. Bugarški¹, M.B. Plavšić¹

¹Faculty of Technology and Metallurgy, Belgrade

²Technical Experimental Centre, Belgrade, Serbia and Montenegro

Although by far the largest percentage of advanced elastomer materials consists of blended elastomers and fillers, there are still many fundamental problems which have yet to be resolved in their structure. It is generally recognized that phase heterogeneity almost always prevails in these blends, but there is a lack of knowledge of the contributions of the individual phases. Phenomena such as polymer compatibility, and phase heterogeneity, cure compatibility, curative migration and phase interaction have to be considered in a design of such materials. In this contribution is considered the influence of two active fillers of basically different structure i.e. carbon black and silica on phenomena mentioned above, for elastomer blend natural rubber / styrene - butadiene rubber.

P.S.A.34.

**CHAIN CONFORMATIONAL STATISTIC AND MECHANICAL PROPERTIES OF
ELASTOMER COMPOSITES**

M.B. Plavšić¹, I. Pajić-Lijaković¹, B. Čubrić¹, R.S. Popović², B. Bugarški¹

¹Faculty of Technology and Metallurgy, Belgrade,

²Technical Experimental Centre, Belgrade, Serbia and Montenegro

The concept of using large - deformation stress properties of elastomers in extension, to elucidate structure of composites with several polymers and fillers is considered. As a prerequisite to this approach, stress behavior of each blend component must be modeled not only with respect to strain, but also with respect to state of cure. The number of empirical constants required to model the stress - strain curves, determines the number of variables required to characterize the present phases. At least one additional variable, describing the type of mechanical coupling between phases is required to completely characterize the system. In spite of the large number of variables that may be required a single stress - strain relation of Mooney - Rivlin type, describing behavior of the material at low and large deformations can be used. The curve, as will be shown, contains potentially infinite number of stress - strain ratio correlations and should contain enough information on conformational polymer properties for resolution of the material parameters.

P.S.A.35.

REINFORCEMENT OF SBR 1500 RUBBER BY SILICA FILLER

N.L. Lazić¹, M.B. Plavšić²

¹Institute of General and Physical Chemistry, Belgrade

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

Ten silica filler, ranging from 69 m²/g to 188 m²/g of the nitrogen BET surface areas, S_{BET}, and DBPA number, N_{DBPA}, from 2,35 cm³/g to 3,2 cm³/g, were used in this study. The average size of primary particles, D_p, was calculated from S_{BET} data. The average size of secondary particles, i.e. aggregates, D_{agg}, effective volume fraction of the filler, f_{eff}, and the distance between these aggregates, d_{aa}, in the filled SBR 1500 rubber were estimated from the both S_{BET} and N_{DBPA}, using equations based on the concepts of occluded rubber and random packing of spheres, whose volume is equivalent to that permeated by individual aggregates. These derived structural properties of silica fillers were correlated with rheological properties of raw rubber, Mooney viscosity at 100 °C, 140 °C, 150 °C, i.e. study effects of temperature on the filler structure in raw rubber, and with the stress-strain properties of vulcanized rubber (tensile moduli at 100 %, 200 % and 300 % elongation and tensile strength at break), i.e. study effects of deformations on the filler-polymer and the aggregate-aggregate interaction. It is found good correlation of d_{aa} and f_{eff} with Mooney viscosity at 100 °C and 140 °C and moduli at 100 % and 300 % elongation, but S_{BET} with 300 % elongation and tensile strength at break.

P.S.A.36.

THE EFFECTS OF ALKYD/MELAMINE RESIN RATIO AND CURING TEMPERATURE ON THE PROPERTIES OF THE COATINGS

R. Ž. Radičević, J. K. Budinski-Simendić

University of Novi Sad, Faculty of Technology, Novi Sad, Serbia and Montenegro

Synthetic resins (acrylic, alkyd, epoxy, polyurethane) are used as the binders in protective coatings. Alkyd/melamine resin mixture is the usual composition for the preparation of coating called "baking enamel". That mixture is cured over the functional groups of resins. In this paper the results of the effects of alkyd/n-butylated melamine resin ratio (from 85/15 to 70/30) and curing temperature (from 100°C to 160°C) on the crosslinking and properties of the coatings are presented. The conversion was determined as the content of functional groups up to definite time. This data was used for the estimation of the degree of crosslinking. The following properties of coating film were determined: hardness, elasticity, impact resistance, degree of adhesion and brightness. On the basis of obtained experimental results, the computer optimization of the composition for preparation of coating with favourable properties was done. Optimal coating properties could be achieved with the alkyd/melamine resin ratio of 75/25, curing temperature of 130°C and the curing time of 30 minutes.

P.S.A.37.

**THE PROPERTIES OF POLYURETHANE SPREADING COATINGS DEPENDING
ON THE COMBINATION OF ISOCYANATES AND POLYOLS**

Č. Lačnjevac¹, D. Chawla², B. Jović³, Lj. Gajić-Krstajić⁴

¹IMS Institute, ²Zorka-boje, Šabac, ³CMS, University of Belgrade, ⁴Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro

The variety of spreading coatings is caused by the fact that there are no universal coatings for the corrosion protection. Their properties depend on the basic raw materials used in the production and on the conditions in which the materials are used.

The basic component of the spreading coatings is the binder, solvent and pigment. In addition to these basic components the spreading coatings also contain plastifier, diluent, filler, siccative and aid agents.

The most important component of spreading coating determining the properties of the formed coating is the binder. The most widely used binders for obtaining the organic spreading coatings are on the basis of plant oils, natural and artificial resins and bitumen.

The properties of polyurethane spreading coatings in dependence on the applied combinations of isocyanates and polyols have been examined in this paper. Namely, it is well known that by varying only a few commercial isocyanates with a lot of different polyols it is possible to obtain an enormous number of polyurethanes of different properties. Several compositions of polyurethane spreading coatings obtained by different combinations of isocyanates and polyols have been examined. The properties of thus obtained polyurethane based coatings have been tested for hardness and wear resistance; stretching and elasticity; adhesion; resilience; corrosion stability; influence of climate conditions (temperature, relative humidity, UV radiation); protective characteristics by means of electrochemical methods. The results gained by these tests showed correlation between the applied combinations of isocyanates and polyols and the properties of the obtained coatings.

P.S.A.38.

THE ELECTROLYTIC HYDROGENATION OF GLUCOSE

T. Trišović¹, Lj. Gajić-Krstajić¹, N. Krstajić²

¹Institute of Technical Sciences of SASA, Belgrade, ²Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia and Montenegro

An electrocatalytic hydrogenation of some organic species takes place by the adsorbed hydrogen electrochemically generated on the catalyst surface by discharge of hydrogen ions, water, or a proton-containing solvent from the adjacent solution. Adsorbed hydrogen then combines with organic reactant to give one or more reduced products.

A limited number of organic electrocatalytic hydrogenation kinetic studies has been reported in the literature [1-2]. For the most part, the goal of these investigations was to derive semiempirical current-voltage rate expressions for experimental data.

A kinetic model for the electrolytic hydrogenation of glucose with simultaneous H₂ generation at Zn-Hg electrode was developed and tested in this paper. The model contains rate equations for the individual Volmer, Heyrovsky and glucose hydrogenation steps, a Langmuir adsorption isotherm for glucose, and equation describing the current efficiencies as a function of current density and concentration of glucose. The theory accurately predicted polarization data and glucose hydrogenation rates.

The results indicate that the mechanism for sorbitol formation with electrogenerated atomic hydrogen on Zn-Hg electrode is the same as that for the high temperature and pressure chemical hydrogenation process.

P.S.A.39.

NEW SIMPLE SYNTHETIC METHOD AND CRYSTAL STRUCTURES OF COBALT(II)-PDTA COMPLEXES

S. Grubišić¹, N. S. Drašković², M. I. Đuran², V. Đinović³, D. D. Radanović¹

¹Institute of Chemistry, Technology and Metallurgy, Belgrade, ²Department of Chemistry, University of Kragujevac, Kragujevac, ³Faculty of Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro

Starting from dibarium salt of PDTA (PDTA is 1,3-propanediaminetetraacetate ion) three new hexadentate cobalt(II) complexes containing counter ions: Ba(II) **1**, Co(II) **2** and Mg(II) **3** have been prepared. The isomorphous complexes **2** and **3** crystallize in the space group *Pnma* of the orthorhombic crystal system. The structural unit consists of discrete Co(II)-PDTA and M(II)-hexaaqua (M(II) = Co or Mg) octahedra, and two water solvent molecules all of which lie on a two-fold axis of symmetry. The complex cations and anions are found to be arranged in the unit cell practically in the same way as in the sodium chloride structure.

P.S.A.40.

**THE SYNTHESIS OF α,ω -DICARBOXYPROPYL POLY(DIMETHYLSILOXANE)S
FROM DIMETHYLDICHLOROSILANE HYDROLYSATE**

M. P. Antić¹, V. V. Antić², M. N. Govedarica²

¹Faculty of Agriculture, Zemun, ²Center of Chemistry, Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia and Montenegro

In this work a series of α,ω -dicarboxypropyl poly(dimethylsiloxane)s (PDMS) of predetermined molecular weights (8000-30000 g/mol), was synthesized from dichlorodimethylsilane hydrolyzate (DDSH) and 1,3-bis(3-carboxypropyl)-tetramethyldisiloxane. The structure of the obtained polymers was verified by IR and ¹H NMR spectroscopy, while their molecular weights were determined by functional group analysis, gel-permeation chromatography and ¹H NMR spectroscopy. The obtained results were represented that the DDSH can successfully be applied for the synthesis of functionalized poly(organosiloxane)s.

P.S.A.41.

**THE COMPLEXES OF ZINC(II), CADMIUM(II), PLATINUM(II)
AND PALLADIUM(II) WITH POTASSIUM-3-DITHIOCARBOXY-3-AZA-5-
AMINOPENTANOATE**

Z. B. Leka¹, T. J. Sabo², Ž. Lj. Tešić², S. R. Lukić³, S. J. Skuban³, S. R. Trifunović⁴

¹Faculty of Metallurgy and Technology, Podgorica, ²Faculty of Chemistry, University of Belgrade, Belgrade, ³Institute of Physics, Faculty of Sciences, Novi Sad, ⁴Department of Chemistry, Faculty of Sciences, University of Kragujevac, Kragujevac, Serbia and Montenegro

The complexes of zinc(II), cadmium(II), platinum(II) and palladium(II) with the new polydentate dithiocarbamate ligand, 3-dithiocarboxy-3-aza-5-amino-pentanoate (daap⁻), type of M(daap)₂·nH₂O (M=Zn(II), Cd(II), n = 2, or M=Pt(II), Pd(II), n = 0), have been prepared and characterized by elemental analysis, IR and UV/VIS spectroscopy. The magnetic measurements are performed too. The spectra of the complexes suggest bidentate coordination of the daap⁻ ligand to the named metal ions via the sulfur atoms of the deprotonated dithiocarbamate group. The fact that under same experimental conditions its S-methyl ester does not form complexes could be taken as a proof of the given method of coordination ligand.

P.S.A.42.

DEPOSITION OF ORGANIC THIN FILMS IN GLOW DISCHARGE

D. Zlatanović

Faculty of Sciences, University of Priština, K. Mitrovica, Serbia and Montenegro

In this work the results of the synthesis of organic thin films in the glow discharge of the mixture of $\text{CF}_4/\text{O}_2/\text{C}_2\text{H}_5\text{OH}$ were presented. The influence of the process parameters on the thickness of deposited thin film was investigated. The index of refraction of deposited thin films is also measured by elipsometry using the He/Ne laser at wave length of incident light of 638 nm. INLINE 700 Tegal Plasma Reactor is used for deposition. The organic thin films were deposited on the polished Si wafers at 13.56MHz glow discharge, the pressure of 100Pa and rf-power of 50 to 300Watts. The mixture of $\text{CF}_4/8\%\text{O}_2$ passed through the vessel with ethanol which temperature changed from 25°C to 60°C before entry the reaction chamber. It established that the deposition rate depends from the power and temperature of ethanol. The index of refraction little changed with the process parameters and was in the range of measuring error.

P.S.B.1.

***ab-initio* MODELLING OF INTERSTITIAL Mg:H SOLID SOLUTIONS**

M. Messina^{1,2}, F. Cleri¹, G. Mazzone¹

¹ENEA, Unità Materiali e Nuove Tecnologie, Centro Ricerche Casaccia, CP 2400, Roma A.D., Italy, ²Università "La Sapienza", Dipartimento di Fisica, Roma, Italy

We studied the thermodynamics of interstitial Mg:H solid solutions by means of *ab-initio* electronic structure calculations. Soft pseudopotentials (Troullier-Martins) with non-linear core correction and Perdew-Burke-Ernzerhof GGA exchange-correlation functionals were employed, in the framework of a DFT plane-wave scheme. Increasing concentrations of interstitial H atoms were inserted in the hcp Mg lattice, in both tetrahedral and octahedral positions. We calculated the energy of solution and the volume variation as a function of H concentration, to obtain energy vs. concentration curves. The results demonstrate that, although thermodynamically unfavoured (since the difference in Gibbs free energy is known to be positive at any H concentration above 10^{-6} %at.), the enthalpic contribution is negative at any H concentration, thus locally favouring H clustering. This reflects the existence of a driving force for the subsequent formation of the metallic hydride. Examination of the changes induced in the Mg electron density-of-states upon H insertion reveal the upward shift of the Fermi level and the creation of deep hydrogen-like states below the metallic band.

P.S.B.2.

APPLICATION OF ZrO₂ - CeO₂ - La₂O₃ FILMS IN MULTILAYERED OXIDE HETERO STRUCTURES

A.N. Khodan, J.-P. Contour, D. Michel

Institute of Physical Chemistry RAS, Moscow, Russia; UMR-0137 C.N.R.S./THALES, Orsay, France; C.E.C.M. C.N.R.S. Vitry-sur-Seine, France

The pulsed laser deposition of cerium-based oxides Zr_{1-x}Ce_xO₂ and Ce_{1-x}La_xO_{2-x/2} has been studied in order to prepare buffer layers tailored to the epitaxial growth on Si, LaAlO₃, SrTiO₃ and MgO. It has been shown that this oxides with a wide variation of lattice constant (0.515-0.552 nm) could be obtained as epitaxial films with low roughness. The target composition, either metallic alloy or sintered oxide ceramic, can strongly influence crystallinity and surface roughness of the grown films even if the chemical composition of the film is the same. High-quality buffers were also grown with a 45° rotation of the in-plane axes with respect to those of the substrates LaAlO₃ and SrTiO₃. Such type of grows was used also to obtain heteroepitaxy for the oxide films with lattice constant ~ 0.36 - 0.39 nm. The properties of YBCO films deposited on these buffered substrates are as good as those for the film grown without any buffer layer, but the field dependence of surface resistance is about $3.8 \cdot 10^{-3}$ mΩ/Oe (77 K, 10 GHz) which is three times smaller than in the case of unbuffered substrates. The quality of Zr_{1-x}Ce_xO₂ buffer layers grown on (001) silicon is beginning to approach to the surface quality of YSZ substrates and the best degree of film crystallinity with the minimum of surface microrelief was obtained using Zr-12%Ce alloy target.

P.S.B.3.

**EFFECTIVE MACROSCOPIC PROPERTIES OF HETEROGENEOUS MATERIALS
MODELLED BY FINITE-ELEMENT METHOD**

I. Krakovský, V. Myroshnychenko

Department of Macromolecular Physics, Faculty of Mathematics and Physics, Charles
University, Praha, Czech Republic

Heterogeneous materials consist of two or more chemically different constituents. They can be prepared in many ways, leading to a large variety of morphologies. The morphology of a heterogeneous material has a big influence on its macroscopic behaviour. Therefore, the relation between the morphology and resulting physical (e.g. dielectric, thermal, elastic, etc.) properties is of great practical importance.

With big progress in computer technology in recent years, the calculation of ... have become an attractive object for computer modelling. This approach also provides a way to design new materials with desired properties.

In this communication, results of modelling of effective dielectric, elastic and electrostrictive constants of periodic two- and three- dimensional periodic heterogeneous materials using finite-element method will be reported.

P.S.B.4.

FIR AND RAMAN SPECTROSCOPY OF POLYCRYSTALLINE α -MnSe

Z. V. Popović, A. Milutinović, N. Tomić, S. Dević

Center for Solid State Physics and New Materials,
Institute of Physics, Belgrade/Zemun, Serbia and Montenegro

In the present paper we investigated polycrystalline α -MnSe samples by FIR and Raman spectroscopy. We offered explanation of some features in FIR spectra of α -MnSe and assigned the second order modes in Raman spectra. We also investigated luminescence in α -MnSe. Step-like shift of excitation bands below T_N demonstrates the correlation with the AFM spin-ordering in this material.

P.S.B.5.

A PHENOMENOLOGICAL ANALYSIS OF SINTERING KINETICS OF ALUMINA

M. V. Nikolić¹, M. M. Ristić²

¹Center for Multidisciplinary Studies of the University of Belgrade, Belgrade, ²Serbian Academy of Sciences and Arts, Belgrade, Serbia and Montenegro

In this paper a phenomenological analysis has been performed of the sintering kinetics of alumina powder compacts with different proportions of small and large particles. A phenomenological approach enables definition of functional connections between parameters characteristic for a certain material and the sintering time. A phenomenological equation is defined, which can be used to describe the densification process of alumina during isothermal sintering. Its parameters enable identification of the dominant diffusion mechanism.

P.S.B.6.

THE INFLUENCE OF MECHANICAL ACTIVATION ON THE STOICHIOMETRY AND DEFECT STRUCTURE IN THE SINTERED ZnO-Cr₂O₃ SYSTEM

Z. V. Marinković¹, L. Mančić², P. Vulić³, O. Milošević²

¹Center for Multidisciplinary Studies, University of Belgrade, Belgrade, ²Institute of Technical Sciences of SASA, Belgrade, ³Faculty of Mining and Geology, Department of Crystallography, Belgrade, Serbia and Montenegro

Mixtures of starting ZnO and Cr₂O₃ powders in equimolar quantities were mechanically activated by grinding using a high energy vibro-mill for 0, 40 and 80 minutes. Qualitative X-ray diffraction analysis after sintering at 900°C during 240 min, implies only the presence of well-crystallized spinel-type phase, ZnCr₂O₄, in all examined samples. A detailed structural analysis of lattice parameters, the average primary crystallite sizes, crystal lattice microstrains is realized by the pattern decomposition technique, performed in accordance with the procedure based on KOALARIET-XFIT program. Due to the importance of cation distribution on the chemical and physical properties of spinels, a study of site occupation factors of ZnCr₂O₄ spinels, i.e. changes in the stoichiometry, has been undertaken. Calculation based on atomistic methods for the simulation and description of the perfect and defect spinel ZnCr₂O₄ crystal lattice has been made, as well as the presence individual structural defects is determined.

P.S.B.7.

DPR ANALYSIS OF MICROSTRUCTURAL EVOLUTION OF ZnO CERAMICS

Z. M. Nikolić¹, V. B. Pavlović², M. M. Ristić³

¹Faculty of Physics, University of Belgrade, Belgrade, ²Faculty of Agriculture, University of Belgrade, Zemun, ³Serbian Academy of Sciences and Arts, Belgrade, Serbia and Montenegro

It is well known that, due to their specific properties, ZnO – based materials are frequently used in electrotechnics and electronics. Since these properties are very much dependable on microstructural state of material (grain size, pore size, d – distribution), in this article systematic investigation of evolution of microstructural constituents occurred during sintering of ZnO has been performed by new digital pattern recognition method (DPR). Microstructure investigations of the influence of the sintering regime on microstructural development of ZnO ceramics were carried out, using the scanning electron microscope (SEM) digital pictures, their contour recognition and decomposition of digital image objects according to their gray scale intensity (automatic microstructural analysis). Obtained results enabled establishing of sintering parameters which are indispensable for processing of materials with advanced required properties.

P.S.B.8.

HALOGENIDE OXIDATION ON PLATINUM CATALYSED Ti_nO_{2n-1}

I. Bošković¹, S. Mentus², M. Pješčić¹

¹Faculty of Metallurgy and Technology, Podgorica, ²Faculty of Physical Chemistry, Belgrade University, Belgrade, Serbia and Montenegro

Titanium oxide Ti_nO_{2n-1} with n predominantly equal to 4, presents a commercial product (trademark name Ebonex) characteristic of high chemical stability and a remarkable electronic conductivity. In electrochemistry it is applied preferably as a catalyst carrier for anodic processes¹. In this work the oxidations of iodides and bromides in water solutions was examined using both compact (sintered) and powdery Ebonex catalysed by platinum. The anodic processes observed are compared to the one observed on smooth platinum. In principle, in each case, known anodic processes: I^- to I_3^- and to IO_3^- as well as Br^- to Br_2 have been observed. However, in comparison to smooth platinum, some particularities in voltammetric measurements were noted for Pt-catalysed, both sintered and powdered Ebonex, and these particularities are discussed in this work.

P.S.B.9.

SINTERING KINETICS OF PZT CERAMICS DOPED WITH NIOBIUM

Lj. Pavlović, M. Lazić

Institute for Technology of Nuclear and Other Mineral Raw Materials, Belgrade, Serbia and Montenegro

Sintering kinetics of PZT ceramics with different amount of Nb₂O₅ (0,2-1,5 mol%) was investigated. Non-isothermal sintering was studied by a dilatometer for temperatures up to 1400 °C, with a heating rate of 5 °C/min in air atmosphere. The sintering mechanism was determined at the initial stage using the Bannister's model. The activation energy of sintering was calculated also. The sintering process started with characteristics viscose flow rearrangement of grains in all investigated composition of PZT ceramics. The activation energy of sintering process showed a value of 750kJmol⁻¹ for PZT ceramics doped with 1% mol Nb₂O₅.

P.S.B.10.

INVESTIGATION OF RINGS EVOLUTION IN ALUMINOSILICATE STRUCTURES: THE COMPARISON OF EXPERIMENTAL AND CALCULATED VIBRATIONAL SPECTRA

S. Marković¹, V. Dondur², R. Dimitrijević³

¹Institute of Technical Science of SASA, Belgrade, ²Faculty of Physical Chemistry, Belgrade,

³Faculty of Mining and Geology, Department of Crystallography, Belgrade, Serbia and Montenegro

Collapse of D4R, which are secondary building units (SBU) in LTA zeolite, and forming of new phases at temperatures above 780°C were examined. With increasing temperature, new phases were produced: carnegieite phase was obtained at 800°C, nepheline structure was formed at 1100°C, while high-temperature carnegieite was produced at 1400°C. All obtained phases contain six membered rings (S6R). Irregularity of S6R causes the appearance of defect modes in the IR spectra. During the heating the symmetry of rings was changed. A semi empirical method MNDO was used for calculations of vibrational spectra of models containing S6R. The calculated vibrational spectra are in good agreement with measured IR spectra of examined phases.

P.S.B.11.

THE OXIDATION STATE OF COPPER ION IN THE ZSM-5 ZEOLITE

V. Rakić¹, V. Dondur², S. Gajinov³, A. Auroux⁴

¹Faculty of Agriculture, Zemun, ²Faculty of Physical Chemistry, Belgrade, ³Institute of General and Physical Chemistry, Belgrade, Serbia and Montenegro, ⁴Institut de Recherches sur la Catalyse, Villeurbanne, France

Copper ions, incorporated as charge-balancing cations in the structure of ZSM-5 zeolites, play a decisive role in the catalytic decomposition of NO_x. In this work, the adsorption of N₂O on Cu-exchanged ZSM-5 zeolites was investigated. The adsorption of CO was performed subsequent to the adsorption of N₂O, on the same samples, *in situ*. The activation of the samples was done overnight, in vacuum. Subsequently, the adsorption of N₂O and CO was studied by microcalorimetry: both adsorption isotherms and the heats of adsorption were recorded, providing the information about the strength and the population of the active sites for adsorption. The experiments of UV-VIS-NIR reflection spectroscopy were performed, also. The changes in the presence and intensities of a band around 1400 nm indicated the changes in the oxidation state of copper ion in the ZSM-5 structure. The activation in vacuum and the adsorption of CO resulted in the reduction of Cu(II) to Cu(I), while the adsorption of N₂O provided the oxidation of Cu(II) to Cu(I).

P.S.B.12.

INTRODUCTION OF Pt AND Pd NANOCLUSTERS IN ZEOLITE CAVITIES BY THERMAL DEGRADATION OF ACETYLACETONATES

Z. Mojović¹, S. Mentus¹, N. Cvjetičanin¹, Ž. Tešić²

¹Faculty of Physical Chemistry, Belgrade University, Belgrade, ²Faculty of Chemistry, Belgrade University, Belgrade, Serbia and Montenegro

Noble metal acetylacetonates under heating in an appropriate atmosphere decompose to pure metal and volatile organic products. In this study zeolite was soaked by acetone solutions of either platinum or palladium acetylacetonate, dried to evaporate solvent and heated to decompose complex compounds. In such a way nanodispersed metallic clusters of platinum and palladium were introduced in zeolite cavities. This material was characterized by both x-ray diffraction and thermogravimetry. In order to get satisfactory electronic conductivity of modified zeolite, carbon black must be added. This material with 10 % carbon black was applied to a rotating glassy carbon disc, and electrolytic water splitting was investigated from slightly acidic solutions. Noble metal modified zeolite displayed pronounced catalytic effect in water electrolysis, enabling, in comparison to smooth platinum, notable faster both hydrogen and oxygen evolution.

P.S.B.13.

LOW TEMPERATURE SPECTROSCOPIC AND DIELECTRICAL PROPERTIES OF PEROVSKITE CRYSTALS DOPED BY d - OR f- IONS

D. Popović¹, S. Spasović¹, J. Dojčilović¹, N. Kulagin²

¹Faculty of Physics, University of Belgrade, Belgrade, Serbia and Montenegro, ²Kharkov National University for Radioelectronics, Kharkov, Ukraine

There has been a great interest in studying perovskite structures for more than thirty years. One of the most interesting perovskite is well known strontium titanate, SrTiO₃.

The paper presents the results of investigation of dielectrical properties of the strontium titanium crystals SrTiO₃, doped by Me- and/or RE ions. We have studied the temperature dependence of the low frequency dielectrical constant - ϵ_r and $\tan\delta$ under 10 - 300 K and Raman spectra on the other hand.

We have studied separate spectroscopic properties such as infrared absorption of the pure and doped SrTiO₃ crystals, also. Interest results were discovered for samples doped by RE ions.

P.S.B.14.

SHORT RANGE ORDERING IN Ba- AND Sr-CELSIAN PHASES

J. Đorđević¹, Lj. Damjanović¹, V. Dondur¹, S. Macura²

¹Faculty of Physical Chemistry, Belgrade, Serbia and Montenegro

²Department of Biochemistry, Mayo Foundation, Rochester, Minnesota, USA

Materials based on Ba- and Sr- celsians are of significant fundamental and practical interest, due to excellent thermal and dielectric characteristics of these phases. Celsian polymorphism is complicated and defined by Si/Al ratio, Si-Al ordering, concentration and nature of extraframework cations. In this work local Si-Al environment and influence of extraframework cations on hexacelsian framework ordering have been investigated by ²⁹Si MAS NMR Spectroscopy. Materials were synthesized by phase transformations of Ba-LTA (Si/Al = 1), Ba-FAU (Si/Al = 1.23) and Sr-LTA (Si/Al = 1) zeolites. Starting from completely ordered framework of LTA zeolite, we obtained completely ordered Ba-hexacelsian_{LTA}, while in a case of Sr-LTA zeolite Sr-hexacelsian with different Q⁴(mAl) environment was obtained which is due to the higher polarizability of smaller Sr²⁺ extraframework cations compared to Ba²⁺ cations and different temperature of synthesis. Hexacelsian_{FAU} also exhibits Si-Al disorder, in agreement with Si/Al ratio, but number of different Q⁴(mAl) building units caused by structural reorganization of tetrahedra is significantly different compared to starting zeolite framework.

P.S.B.15.

MAS NMR AND INFRARED SPECTROSCOPIC STUDY OF Al-Si ORDERING IN MAGNESIUM CORDIERITE PHASES

V. Dondur¹, R. Dimitrijević¹, Lj. Damjanović¹, S. Macura³

¹Faculty of Physical Chemistry, Belgrade, ²Faculty of Mining and Geology, Belgrade, Serbia and Montenegro; ³Department of Biochemistry, Mayo Foundation, Rochester, USA

The magic angle spinning NMR is a sensitive probe for the local atomic configuration of tetrahedral Si sites in aluminosilicate minerals. The Si and Al ordering in synthetic magnesium cordierite polymorphs annealed from zeolite precursors (Mg-LTA, Mg-FAU and Mg-GIS) is investigated. Crystallization of zeolite precursors at temperatures between 1100-1200°C yields metastable γ -cordierite, which on annealing transforms in α -cordierite phase. All ²⁹Si MAS NMR spectra of α -cordierite show well distinguished resonances. The T1-chain and T2-ring sites are totally split into two separate groups of resonances. In each group four resonances originating from Si(nAl) n=1-4 environment are present. The two groups of resonances are also present in the ²⁹Si MAS NMR spectra of γ -cordierite. But the spectra of γ -cordierite exhibit very distorted and ill-defined peak profiles. The ²⁷Al MAS NMR spectra of all investigated samples of γ -cordierite showed only one maximum attributable to tetrahedral Al. FTIR spectra were obtained for the α and γ -cordierite samples with different Si/Al ratios. All spectra were similar in general envelope. A progressive loss of resolution with increasing Si content suggests a concomitant increase in disorder in γ -cordierite. These data are in agreement with results obtained from NMR study.

P.S.B.16.

SEM STUDY OF FERROELECTRIC DOMAINS IN MODIFIED BaTiO₃ CERAMICS

Lj. Živković¹, V. Paunović¹, Lj. Vračar¹, M. Miljković²

¹Faculty of Electronic Engineering, Niš

²Laboratory for Electron Microscopy, University of Niš, Serbia and Montenegro

Many of the properties of ferroelectric ceramics, such as dielectric constant and dielectric losses are related to the domain structure and to the motion of domain boundaries. The domain structure, which is formed during the cubic to the tetragonal phase transformation at Curie temperature, enables the release of stresses induced into crystal. The configuration and type of domains depend on the microstructure obtained during sintering process and on the presence of the additives. This paper concerns the peculiarities of domain structure of undoped BaTiO₃ and BaTiO₃ sintered with various additives. The ferroelectric ceramics doped with Mn, Ca, Y and Nb, with different grain size, density and porosity were investigated using scanning electron microscope. In order to study the influence of domain structure on the ferroelectric properties the dependence of dielectric constant on the domain width was also investigated.

P.S.B.17.

ANALYSIS OF THERMAL DISTRIBUTION IN MODULES WITH Al_2O_3 AND EPOXY SUBSTRATES

B.Radojčić, R. Ramović¹, O.Aleksić
Institute of Security, Belgrade

¹Faculty of Electrical Engineering, Belgrade, Serbia and Montenegro

The influence of electronic substrates on thermal design and cooling in electronic devices are described in brief, since the main way to sink the dissipated heat is to transfer it to substrate by conduction from the small area of the heat source. The equation governing the heat conduction in substrates and the appropriate model are given together with thermal properties of various types of substrate materials and components. Two-dimensional theoretical model is presented as it includes temperature dependent heat conductance and specific heat and takes into account the geometry of the devices, the material thermal conductivity, different dissipation mechanisms, as well as all possible ways to transfer the dissipated heat. Experimental temperature distribution of two modules with different substrates is given using a matrix of flip-chip NTC sensors. Theoretical and experimental analysis of thermal distribution of two modules such as the thick film module and the SMT module are discussed. Theoretical and experimental thermal distributions obtained for module on Al_2O_3 and epoxy substrate at different ambient temperatures and power loads were then compared.

P.S.B.18.

MID-INFRARED SPECTROSCOPY INVESTIGATION OF STUFFED DERIVATIVES OF CRISTOBALITE PRODUCED FROM ZEOLITES WITH DIFFERENT EXTRAFRAMEWORK CATIONS

R. Hercigonja¹, V. Dondur¹, V. Rakić³, R Dimitrijević², S. Marković⁴

¹Faculty of Physical Chemistry, Belgrade, ²Faculty of Mining and Geology, Belgrade, ³Faculty of Agriculture, Belgrade, ⁴Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro

Stuffed derivatives of cristobalite were produced by thermally induced phase transformation of zeolites in temperature range from room to 1400°C. In this way produced, these interesting phases were analysed by mid infrared spectroscopy (MIR), which provided information about their structure, their ordering and Al/Si ratio. The experimentally obtained IR spectra were mathematically deconvoluted. The changes in the bands sensitive to the type, charge and position of a cation in the lattice were noticed, as a result of phase transformations. The spectral changes found in the case of these bands (580 cm^{-1} , 780 cm^{-1} and 390 cm^{-1}) are interpreted a consequence of cation movement and displacement in the lattice.

P.S.B.19.

SURFACE COMPOSITION AND ADSORPTION PROPERTIES OF ACTIVATED CARBON CLOTH

T. Vasiljević¹, M. Bačić¹, M. Laušević¹, A. Onjia²

¹Faculty of Technology and Metallurgy, Belgrade,

²Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

Surface properties of activated carbons have shown to play an important role in adsorption process. The presence of various functional groups (such as phenolic, carbonyl, carboxylic) on the carbon surface depends on the nature of its base component and the activation technique employed in the manufacturing process.

The aim of this work is to gain a better fundamental understanding of the nature of surface oxide sites present on activated carbon cloth surface (ACC), and their role in the adsorption process. BET surface areas of ACC were measured by means of benzene adsorption isotherms. The amount and the type of surface oxygen groups were determined by thermogravimetric analysis and classical titration following Boehm's method. Batch adsorption tests were used to evaluate equilibrium adsorption isotherms of phenol on ACC.

It was shown that both surface area and surface groups composition had impact on adsorption properties of ACC against phenol.

P.S.B.20.

MICROABRASION METHOD FOR THICKNESS DETERMINATION OF PLASMA NITRIDED LAYER

D. Mikičić¹, A. Kunosić¹, M. Zlatanović¹, Ž. Đurišić¹, Z. Karastojković²

¹Faculty of Electrical Engineering, Belgrade, ²Polytechnic Academy, New Belgrade, Serbia and Montenegro

Calo-test method of microabrasion has been usually used for thickness measurement of thin, compact and clearly distinctive surface layers in hard coatings area. Authors developed application of this technique to measuring thickness of visually not distinctive layers in plasma nitriding. Samples made of various steel grades were plasma nitrided and then calo-tested. Chemical process was applied to visualize structure of different layers on abraded places. Observed relations of layers color and structure were steel grade dependent. Possibility was confirmed to determine the thickness of compound nitrided layer within 5% accuracy by measuring rings radii of visualized layer cross-section in the calo-test trace.

P.S.B.21.

THERMODYNAMIC STUDY OF Ga-BASED LIQUID BINARY SYSTEMS SHOWING INTERFACIAL PHASE TRANSITIONS

D. Živković¹, D. Manasijević¹, A. Kostov²

¹University of Belgrade, Technical Faculty, Bor, ²Copper Institute, Bor, Serbia and Montenegro

Some Ga-based binary systems, like Ga-Bi, Ga-Pb and Ga-Ge liquid alloys, became recently a subject of numerous investigations for interfacial phase transitions, like surface and grain boundary melting, surface freezing or wetting transitions, which are of actual interest in different fields. For better understanding of these phenomena, an accurate knowledge of the thermodynamic properties and phase diagram is essential. Although phase diagrams of mentioned Ga-based binary systems are well known, thermodynamic properties are not so numerous. Results of thermodynamic analysis of liquid Ga-Bi, Ga-Pb and Ga-Ge alloys, obtained by quantitative DTA, calorimetry and calculated analytically, are presented in this paper. Integral enthalpies of mixing in liquid state were determined experimentally and activities for gallium and the other component (Bi, Pb, Ge) were defined in wide temperature ranges. Comparison between experimental, calculated values and existing literature data shows good agreement.

P.S.B.22.

RAMAN INVESTIGATION OF DX-LIKE CENTERS IN INDIUM DOPED $\text{Pb}_{1-x}\text{Sn}_x\text{Te}(\text{In})$

D. Stojanović¹, N. Romčević¹, D.R. Khokhlov², M. Romčević¹, A. V. Nikorich³

¹Institute of Physics, Belgrade, Serbia and Montenegro

²Physics Department, Moscow State University, Moscow, Russia

³Applied Physics Institute of the Moldavian Academy of Science, Kishenev, Moldavia

In this work we presented Raman scattering spectra and results of galvanomagnetic measurements of $\text{Pb}_{1-x}\text{Sn}_x\text{Te}$ ($x = 0; 0.15; 0.25$) doped with indium. In spectral range 20 to 104cm^{-1} (optical range of PbTe based alloys) we registered well resolved features at 28, 42, 47, 59, 75 and 95cm^{-1} , which tend to follow the host lattice density of state. At frequencies above 104cm^{-1} we registered two types of line: 1) local modes at $\omega_1=115$, $\omega_2=155$ and about $\omega_3=190\text{cm}^{-1}$, which corresponded In^{2+} , In^{3+} and In^+ impurity states; 2) modes which correspond to electron transition between impurity levels (E_1-E_2) and transitions between valence band and impurity levels (E_1-E_v , E_2-E_v). To describe the observed features we used the model of multiphonon emission process and considered the related kinetic equations. Comparing experimental results with the prediction of the model we characterized In impurities as DX-like centers.

P.S.B.23.

TEMPERATURE AFFECT TO ALGAAS/GAAS HETEROJUNCTION PROPERTIES

D. Čevizović¹, R. Šašić², R. Ramović¹

¹Faculty of Electrical Engineering, Belgrade,

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

The physically properties of semiconductor heterojunctions are significantly depend of the device operating temperature. In order to modeling of temperature affect to the output characteristic of semiconductor junction based devices, it is necessary to study its affect to some heterojunction parameters like as: ionized donor concentration, Fermi energy level, channel carrier density, off voltage, channel carrier mobility, etc. In this paper, the heterojunction temperature influence to channel surface carrier concentration density is investigated. Also, temperature dependence of the ionized donor concentration in the AlGaAs bulk and Fermi energy level are included. The numerical algorithm is developed and applied to the concrete heterostructure. The results are graphically presented and discussed.

P.S.B.24.

THE INVESTIGATION OF MAGNETIC SUSCEPTIBILITY IN AMORPHOUS $\text{Fe}_{43,2}\text{Ni}_{23,2}\text{Co}_{13,6}\text{B}_{20}$ SYSTEM

S. Bikić¹, I. Gazdić², M. Tais³, S. Sulejmanović⁴, N. Bajrović⁴, T. Mihač⁴

¹Faculty for Materials and Metallurgy, Zenica, ²Educational and Pedagogical Institute, Tuzla,

³Federal Meteorological Bureau, Sarajevo, ⁴Faculty of Sciences, Dept.of Physics, Sarajevo, Bosnia and Herzegovina

In this paper the temperature dependence of magnetic susceptibility of a multicomponent ferromagnetic amorphous system was investigated. The tests were performed in the temperature range of 77K to 180K, and then compared with the tests performed on relaxed samples of the same composition.

The aim of the investigation was to get more information on the structural characteristics as well as to establish and confirm the existence of early metastable states in the samples frozen at the temperature of liquid nitrogen.

For the purpose of these investigations a special sensitive method of measurements of a.c. magnetic susceptibility was developed, which enabled the simultaneous measurement of the real and imaginary component of the measured quantity. The obtained results are given in graphical form.

P.S.B.25.

2nd HARMONIC THERMAL WAVES IN A MATERIALS CHARACTERIZATION

A. Kapidžić, M.D. Dramićanin,

Institute of Nuclear Sciences "Vinča," Belgrade, Serbia and Montenegro

We performed numerical simulation of photothermal experiments when thermal coefficients of material are temperature dependant. Generation of thermal wave 2nd harmonic is observed with its amplitude proportional to square of probe intensity. Phase exhibits abrupt changes on discontinuities. Thermal length resolution is considerably increased. Promising applications for materials characterization are discussed.

P.S.B.26.

OFF CENTERS IN $\text{PbTe}_{0.95}\text{S}_{0.05}$ SINGLE CRISTAL: ULTASONIC STUDY

J. Trajić¹, V.N. Nikiforov², N. Romčević¹, M. Romčević¹, A.N. Vasil'ev²

¹Institute of Physics, Belgrade, Serbia and Montenegro

²Department of Low-Temperature Physics, Moscow State University, Moscow, Russia

The paper is concerned with measurements of the velocities of longitudinal and transverse ultrasound in $\text{PbTe}_{0.95}\text{S}_{0.05}$ at 4.2 – 300K. The measurements were carried out using the contactless method based on electromagnetic excitation of ultrasound in conducting media. The structural phase transition at 40K was detected by the EMA resonance technique. At the same temperature the anomalies of the dielectric susceptibility, as well as of the Hall mobility were revealed. In binary compounds PbTe and PbS no phase transition occurs in the temperature range studied. That is why the origin of the effect is of interest. We suppose that the sulphur atoms forms so called off-centers, registered before in KCl doped with Li, for example. This effect means that small impurity atoms that substitute for larger ones are displaced from the regular sites in lattice, for about 0.5-1Å. On that way the permanent dipole is formed and local conditions near the impurity atom is changed.

P.S.B.27.

**NOBLE METALS BINDING ON THE MACROPOROUS POLY(GMA-CO-EGDMA)
MODIFIED WITH ETHYLENEDIAMINE**

A. Nastasović¹, S. Jovanović², D. Jakovljević¹, A. Onjia³, S. Stanković²

¹IchTM-Center for Chemistry, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade,

³Vinča Institute of Nuclear Sciences, Chemical Dynamics Laboratory, Belgrade, Serbia and Montenegro

Macroporous crosslinked poly(glycidyl methacrylate-co-ethylene glycol dimethacrylate) copolymer, poly(GME), was synthesized by radical suspension copolymerization and modified with ethylenediamine, EDA. Useability of poly(glycidyl methacrylate-co-ethyleneglycol dimethacrylate) copolymer with attached EDA, poly(GME)-en, for the noble metals sorption from aqueous solutions was investigated. Sorption rate and capacities of poly(GME)-en for gold, platinum and rhodium, as well as pH dependence of Pt⁴⁺ ions sorption under non-competitive conditions were determined.

P.S.B.28.

**MODIFICATION OF ETHYLENE-NORBORNEN COPOLYMER BY IRRADIATION
WITH N⁴⁺ ION BEAMS**

Z. Kačarević-Popović, N. Tjapkin, M. Šiljegović, I. Draganić

Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro

Most ion-beam surface modification efforts on polymers have been so far directed towards the effect on electrical properties because of its commercial importance (radio frequency shielding, antistatic surfaces, battery membranes, conducting polymers, conducting paths in microelectronic, ferromagnetic polymers, photoresists, semiconducting polymers and optical waveguides). In this work the behavior of copolymer of ethylene and norbornen irradiated with 60 keV N⁴⁺ ions to the fluences of 1.0×10^{16} ions cm⁻² was studied at low electric field strengths. The increase of electrical conductivity and changes in dielectric properties are directly related to the changes of chemical structure of the polymer. The property improvements (mainly attributable to conjugated double bond formation and crosslinking) were related to electronic energy transfer (excitation and ionization).

P.S.B.29.

STRUCTURAL CHANGES IN HIGHLY CROSSLINKED POLYETHYLENE-POLYPROPYLENE BLENDS AS MEASURED BY DSC METHOD

D. Babić, Z. Kačarević-Popović, M. Marinović-Cincović
Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro

Radiation crosslinking and scission of polymers represents a useful specific tool for modification of properties of these materials. In this work supermolecular structure changes of gamma irradiated to the 1650 kGy PE-PP blends are investigated and correlated with the changes in the molecular structure due to crosslinking. The structural changes in PE-PP blends are discussed in terms of the physics of collective phenomena that are measured by technique that substantially focus on collective properties, the technique of different scanning calorimetry. In order to acquire more direct structural information concerning the effect of irradiation the activation energy of ordering transition and number of defects are estimated from heat capacity changes and correlated to G-values for the number of crystalline units excluded from the crystal calculated from the depression of melting temperature. An attempt was made towards the reveal of the crosslinks role as the source of crystal memory.

P.S.B.30.

MORPHOLOGY OF POLYETHERSULFONE FLAT SHEET MEMBRANES

V. Laninović¹, K. Jeremić²
¹IMS Institute, Belgrade

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

A good integrally skinned asymmetric membrane comprises a thin, defect-free skin and an open porous sublayer with sufficient mechanical stability. In preparation of such asymmetric polymer membranes the immersion precipitation (wet cast) process has been commonly employed. In this process exchange of solvent and nonsolvent across the interface induces the phase separation in the polymer film, which can lead to a variety of asymmetric structures. The most commonly seen structure is either a dense thick top layer supported by a fine porous layer containing pores of similar sizes, or a thin top layer supported by a very porous sublayer containing mostly large elongated voids (macrovoids). The former is often called sponge structure and the later is called finger-like structure. These finger-like voids usually weaken the membrane so that such a membrane may not maintain its integrity under high operating pressure.

It has been shown that polymer membranes with different morphology can be prepared by changing the parameters of the wet cast process. In this paper we investigated the effect caused by the addition of nonsolvent additive in polymer solution on the structure of polyethersulfone membranes. The obtained scanning electron micrographs (SEM) of the prepared membranes has been shown that the type of the nonsolvent additive in polymer solution affect the final morphology of the polyethersulfone flat-sheet membranes.

P.S.B.31.

GLASS TRANSITION TEMPERATURE DETERMINATION OF MACROPOROUS COPOLYMER BY INVERSE GAS CHROMATOGRAPHY

A.B. Nastasović¹, A. Onjia², S.K. Milonjić², S.M. Jovanović³

¹Institute for Chemistry, Technology and Metallurgy, Center for Chemistry, Belgrade, ²Vinča Institute of Nuclear Sciences, Chemical Dynamics Laboratory, Belgrade, ³Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

The glass transition temperature, T_g , of crosslinked macroporous glycidyl methacrylate, GMA, based copolymer was studied by inverse gas chromatography at zero surface coverage (IGC-ZC). The specific retention volumes, V_g^0 , of test compounds with different chemical structure and polarity were obtained in the temperature range 333-413 K. The T_g value of investigated macroporous copolymer was determined from the maximum points of the plot $\ln V_g^0$ vs. $1/T$ for investigated test compounds.

P.S.B.32.

OBTAINING CRITICAL RATE OF PLANE-TO-CELLULAR INTERFACE TRANSITION

S. Nikolić¹, V. Radojević², A. Valčić², A. Golubović¹

¹Institute of Physics, Zemun,

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

The structure of single crystals of a superalloy based on nickel is dendritic, and the chemical composition is very inhomogeneous. If the content of the solute rises during solidification, the solid-liquid interface changes from planar to a cellular and finally to a dendritic one. The exact moment of the transition from a cellular to a dendritic structure is not clearly defined in the literature. The critical rate of plane-to-cellular interface transition, R_{pc} , was defined and calculated.

P.S.B.33.

CRYSTALLIZATION BEHAVIOR OF Nd-Fe-B BASED ALLOYS AFTER HEAT TREATMENT

J. Stajić-Trošić, V. Čosović, N. Talijan

Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia and Montenegro

Crystallization behavior of Nd-Fe-B based alloys with different Nd content has been studied from the point of their magnetic properties and corresponding microstructure. For investigation two types of Nd-Fe-B alloys were selected: the first type with stoichiometric composition of Nd in relation to $\text{Nd}_2\text{Fe}_{14}\text{B}$ and the second type with low content of Nd. For observation of phase transformations in applied heat treatment regime different investigation techniques were used, such as XRD analysis, Mössbauer phase analysis, etc. The neodymium rich type with almost $\text{Nd}_2\text{Fe}_{14}\text{B}$ monophase structure has good magnetic properties and it is not very sensitive to elevated temperatures and grain growth. The second type of the investigated Nd-Fe-B alloy has composite microstructure with prevailing Fe_3B particles which is responsible for its reduced coercivity and higher sensitivity to the applied heat treatment. However this annealed microstructure favours other magnetic properties. Investigated alloys are suitable for interpretation and comparison of coercive mechanism resp. phase transformations in the function of the chemical composition and applied heat treatment with magnetic properties.

P.S.B.34.

THE INFLUENCE OF SMALL DEFORMATIONS ON THE EFFECT OF THERMAL AGEING OF THE ALLOY AlLi 8091

O. Novitović¹, M. Rebernik², A. S. Nikolić³

¹Technical College, Užice, Serbia and Montenegro, ²Atotech, Podnart, Radovljica, Slovenia,

³Faculty of Chemistry, Belgrade, Serbia and Montenegro

Alloys of the system Al-Li-Cu-Mg-Zr belongs to the group of high-straight alloys which achieve their properties by thermal treatment. Taking into account the importance of this system, as well as insufficient study of the influence of small deformations on structural behavior and the properties of this alloy, this work follows the mechanism and precipitation kinetics of these alloys in conditions of isothermal ageing and with effect of small deformations.

The alloy has been thermally dissolved at 540°C for 30 minutes, water quenched and deformed on the electron braking machine Zwick 1484, of 3.2%. The samples were prepared in the form of plates of 100x20x1 mm. After quenching and deformation they were extended and then cut to the size of 10x20x1 mm, and isothermally aged at 175, 190 and 205°C.

By TEM and the method of quantitative metallography, mechanism and kinetics of precipitation were followed and results compared with the samples that are treated in the same conditions, but without deformation. Effect of deformation caused some changes in the mechanism and kinetics of the precipitation.

P.S.B.35.

APPARENT ENTHALPIES OF ACTIVATION OF OXYGEN REDUCTION AT Pt_3Co ELECTRODE IN ALKALINE SOLUTIONS

M. D. Obradović¹, B. N. Grgur², Lj. M. Vračar²

¹ICTM – Department of Electrochemistry, Belgrade,

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

The oxygen reduction at Pt_3Co electrode in alkaline solutions is characterized by two linear $dE/d \ln j$ regions. At low cds the slope is $-RT/F$, while at high cds it is $-2RT/F$. Irrespective of the difference in the Tafel slopes, which usually implies different mechanisms it was suggested that in both cd regions, the first charge transfer step is rate determining. The difference in the Tafel slopes arises from different conditions of adsorption of reaction intermediates. In the high cd region adsorption with oxygen species is below a critical level and Langmurian adsorption conditions prevail. In the low cd region, coverage with reaction intermediates, θ , is appreciable and Temkin kinetics must be considered.

In addition to confirming the mechanism of oxygen reduction in the two cd regions, determination and analysis of the apparent enthalpies of activation at different pH 's, $\Delta H^\#$, is made, and the validity of the model and mechanism of the oxygen reduction on Pt_3Co was discussed.

P.S.B.36.

THE ZINC CORROSION IN NEAR NEUTRAL EDTA SOLUTIONS

S. Stanković¹, B. Grgur², N. Krstajić², M. Vojnović²

¹Department of Analytical Chemistry, ²Department of Physical Chemistry and Electrochemistry, Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia and Montenegro

The kinetics investigation of cathodic (hydrogen evolution reaction – *her*) and anodic (zinc dissolution reaction – *zdr*) corrosion half reactions was done in near neutral Ethylenediaminetetraacetic acid ($\text{EDTA-H}_4\text{Y}$) solutions with systematically varied composition: (i) at different pH values ($\text{pH} = 3.0-10.0$) and constant total molar EDTA concentration ($c_M(\text{H}_4\text{Y}) = \text{const.}$) and (ii) with different concentrations $c_M(\text{H}_4\text{Y})$ ($0.05 - 0.20 \text{ mol dm}^{-3}$) and $\text{pH} = \text{const.}$ A cathodic and anodic polarization curves of zinc corrosion half reactions are determined by using galvanostatic stationary voltammetry. Corrosion potentials and densities are determined graphically from the cathodic and anodic polarization curves in the lower interval of current densities ($cd's$) (near $10^{-5} - 5 \cdot 10^{-4} \text{ A cm}^{-2}$) and additionally more the corrosion potential by direct measuring. Obtained corrosion parameters of potential and current density in function of the pH and $c_M(\text{H}_4\text{Y})$ are different, depending on the pH range of solution. The change is noticeable at the $\text{pH} \approx 8$. On the basis of obtained experimental data from the polarization curves the corrosion half reaction and parameters are determined and the mechanism of zinc corrosion process as well.

P.S.B.37.

FRACTURE TOUGHNESS MODELLING IN HIGH-STRENGTH Al-BASED ALLOYS

M. Vratnica¹, Z. Cvijović², M. Rakin²

¹Faculty of Metallurgy and Technology, Podgorica,

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

The fracture toughness of the commercial 7xxx alloy in T73 overaged temper is modeled to determine the influence of the microstructural parameters associated with the coarse constituent particles on the fracture process. To develop quantitative relationships between plane strain fracture toughness, K_{Ic} , and microstructural attributes an extensive stereological analysis together with mechanical tests are performed. Fracture behavior of heat treated forgings is characterized as a function of Fe and Si impurity levels and specimen orientation. The data are compared to current fracture toughness models, with the results being used to improve the modeling of toughness using microstructural parameters and basic tensile properties. The appropriate modification of a multiple micromechanism-based model is proposed. This required the measure of parameter representing the relative contributions of different fracture micromechanisms to the fracture-surface morphology.

P.S.B.38.

PRETZEL: A NEW TYPE OF FULLERENES

L. Matija¹, J. Simić-Krstić², Đ. Koruga³

¹Institute of Technical Sciences of SASA, Belgrade, ²IHIS Institute, Zemun-Belgrade, ³Faculty of Mechanical Engineering University of Belgrade, Belgrade, Serbia and Montenegro

Under standard method of fullerenes synthesis, carbon dust has been produced by electrical arc. After extraction and separation of C_{60}/C_{70} , a small quantity of higher fullerenes has been identified by mass spectroscopy. Material is deposited on gold substrate and surface was characterized by STM. New form of fullerenes, like pretzel, was observed. According to Descartes-Euler formula for polyhedra, it is possible to explain transformation (vertices, faces and edges) from sphere to pretzel. In paper we discuss this transformation from both theoretical and experimental points of view.

P.S.B.39.

INTERCALATED DERIVATIVES C₆₀ WITH UNORGANIC SALT

A. Đorđević¹, M. Vojinović-Miloradov¹, A. Kapor¹, D. Lazar¹, D. Petrović², M. Hegediš

¹University of Novi Sad, Faculty of Natural Sciences and Mathematics, Novi Sad, ²University of Novi Sad, Technical Faculty, Novi Sad, Serbia and Montenegro

The paper presents syntheses and separation of the intercalated derivatives C₆₀ from ethylbenzene and ethanol solution: Pb(NO₃)₂, CsCl, Cr(NO₃)₂, Co(NO₃)₂, Cd(NO₃)₂, Ni(NO₃)₂, respectively. Brown precipitates of the intercalated derivatives C₆₀ are formed from the saturated solution of C₆₀ in ethylbenzene by adding the concentrated ethanol solution salt. The intercalates were separated from the solution by centrifuge. By IR scanning of intercalated the result was getting the identical spectra as in the case of intercalation with ethylbenzene/ethanol. X-ray structural analysis showed the different d values with respect to C₆₀ ethylbenzene/ethanol. Intercalated of C₆₀ with inorganic salts was assumed on the basis of the calculation of unit cell parameters from d values in hexagonal crystal system already known dimension of the ions and the spaces in the solid state disorder hexagonal pack. A significant change in crystalline unit cell volume was observed, compared to C₆₀ ethylbenzene/ethanol (1.443 nm³) in the interval 1.398-1.562 nm³. It is possible to establish the relationship between the dimensions of metal salt ions and the changes in the elementary cell. Thermal and microanalysis were performed in order to confirm the existence of salt ion in the intercalate derivatives.

On the basis of the known properties of C₆₀ in solid state, this investigation can be of a great interest for stoking of the radioactive salts within the solid state of C₆₀.

P.S.B.40.

OPTICAL DIAGNOSTICS OF CARBON ARC AND INDUCTION PLASMAS IN FULLERENE PROCESSING

B. Todorović-Marković¹, Z. Marković¹, I. Mohai², Z. Karoly², L. Gal², J. Szepvolgyi²

¹"Vinča" Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro, ²Chemical Research Center, Hungarian Academy of Sciences, Budapest, Hungary

In this article, the analysis of the optical diagnostics of carbon arc and induction plasma in the process of fullerene synthesis is presented. The effect of carbon concentration on rotational and vibrational temperatures of C₂ clusters was investigated. Based on the obtained results, it was concluded that the vibrational temperature of C₂ clusters was the real temperature of carbon plasma. The rotational temperature of C₂ clusters was not the real temperature of carbon plasma due to selfabsorption.

P.S.B.41.

**OPTIMIZATION OF EXTRACTION WITH TOLUENE AND CHLOROBENZENE
AND CHROMATOGRAPHY OF CARBON CLUSTERS C₆₀ AND C₇₀**

T. Jovanović¹, Dj. Koruga², B. Jovančičević¹, J. Simić-Krstić³

¹Department of Applied Chemistry, Chemical Faculty of Belgrade University, Belgrade,

²Molecular Machine Research Center, Mechanical Engineering Faculty of Belgrade University, Belgrade, ³Fullerenes Science and Technology Center, Chemical Power Sources Institute,

Belgrade-Zemun, Serbia and Montenegro

Fullerenes C₆₀ and C₇₀ were Soxhlet extracted with toluene from carbon soot produced by electrical arc method. Toluene extract yield was 5.4 %. The remaining soot was Soxhlet extracted with chlorobenzene, modifying the original methodes. The additional chlorobenzene extract was obtained in 0.4 % yield. We increased the entire fullerenes extract yield to 5.8 %, due to modification of the existing methodes. Toluene extract was separated by column chromatography on active Al₂O₃ by elution with hexane and benzene/hexane mixtures. All chromatographically purified fractions, toluene and additional chlorobenzene extract were characterized by UV/VIS and IR spectroscopy. The first fraction was also analized using EI mass spectrometry. Buckminster fullerene C₆₀ was identified dominant in the first, while C₇₀ in the second and the third fraction. Our analizes indicated that toluene soot extract contains predominantly fullerene C₆₀ and in much less extent C₇₀, which was identified dominant in additional chlorobenzene extract.

P.S.B.42.

**INVESTIGATIONS OF OPTICAL PROPERTIES OF NANOSCALE FULLERENE
FILMS**

N. Popović¹, I. Koruga², J. Jovanović³, J. Simić- Krstić¹

¹Institute of Chemical Power Sources (IHIS), Zemun, ²Department of Physics, University of Arizona, Tucson, USA, ³Institute of Technical Sciences of SASA, Belgrade, Serbia and

Montenegro

Subwavelength Optical Elements (SOEs) – smaller than the walength of light are a new class of optical elements promising multi – layer integration and new approach to optical systems design. Vacuum evaporation standard technique has been used to produce thin films of C₆₀ (nano films <100 nm). We made some experimental trials to replace glass plates in transparent glass – C₆₀ - glass structure by polymer (polysiloxane) layer and discussed optical properties of such structures.

P.S.B.43.

SPECTROPHOTOMETRY CHARACTERIZATION FULLERENE THIN FILMS

A. Nikolić, V. Zarubica, V. Skerović

Bureau of Measures and Precious Metals, Belgrade, Serbia and Montenegro

In this paper the permeability measurements of fullerene thin film samples, 30nm, 60 nm, 100 nm i 250 nm thickness, is presented. The measurements is observed with nonillumination samples and with samples under polarized light. Light wave lengths gauge for each of the realization measurements is since 400 nm till 1000 nm. On the fixed wave lenght by 560 nm values ratio of s and p polarization is measured and polarization plane rotation for nonillumination and illumination samples is noticed. Measurements are observed in Laboratory for photometry and radiometry of Bureau of measures and precious metals.

P.S.B.44.

INVERSE GAS CHROMATOGRAPHY STUDY OF SYNTHETIC HYDROXYAPATITE SURFACE BY HEXANE ADSORPTION AT FINITE SURFACE COVERAGE

I. D. Smičiklas, A. E. Onjia

Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro

The sorption of both organic and inorganic substances on synthetic hydroxyapatite (HAP) was studied intensively in the last decade, due to HAP application in diverse fields of science and technology. In this paper, HAP was synthesized by neutralisation method. The obtained powder was pure, stoichiometric HAP, with specific surface area of 21 m²/g, determined by N₂ adsorption. The chromatographic column was filled with the synthesized HAP powder and the adsorption of n-hexane was studied, at finite surface coverage. Different volumes of adsorbate were injected (1-6 µl) in the temperature range 433-463 K. Sorption isotherms were determined, using BET model. From the linear BET equation, monolayer coverages (α_m) and BET constans (C) were calculated, for each working temperature. The values of α_m were used to estimate the specific surface area. Isotheric heat of adsorption (q_{st}) was calculated and discussed, as well as the adsorption energy distribution function (χ).

P.S.C.1.

PECVD OF *h*-BN AND *c*-BN FILMS FROM BORANEDIMETHYLAMINE AS A SINGLE SOURCE PRECURSOR

G. A. Battiston¹, D. Berto¹, A. Convertino^{1,2}, D. Emiliani¹, R. Gerbasi¹, S. Viticoli²

¹Istituto di Chimica Inorganica e delle Superfici del C.N.R., Padova, Italy, ²Istituto per lo Studio dei Materiali Nanostrutturati del C.N.R., Monterotondo St. (Roma), Italy

Boron nitride thin films have successfully grown via low pressure plasma enhanced chemical vapour deposition (PECVD) by using boranedimethylamine, $\text{BH}_3\text{NH}(\text{CH}_3)_2$, as a single source precursor in the temperature range 300-550°C in a nitrogen-argon atmosphere. The plasma power steered the ratio between the cubic and the hexagonal phase. The annealing of the *h*-BN films at temperatures up to 1000°C in a controlled atmosphere gave rise to their transformation into the cubic phase. FTIR measurements were utilized as a valid probe for identifying the structure of BN films. UV-visible spectroscopy was carried out in order to investigate the optical behaviour of the films.

P.S.C.2.

HIGH-TEMPERATURE BEHAVIOR OF SILICON CARBONITRIDE NANOPOWDERS USED AS STARTING MATERIALS OF ADVANCED CERAMIC NANOCOMPOSITES $\text{Si}_3\text{N}_4/\text{SiC}$

D. Hourlier Bahloul¹, B. Doucey¹, Lj. Čerović², S. Milonjić²

¹UMR CNRS 6638, SPCTS, Limoges, Cedex, France

²Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

The Si/C/N nanopowders, with a homogeneous distribution of Si, C and N at an atomic level, were used as starting powders to obtain $\text{Si}_3\text{N}_4/\text{SiC}$ nanocomposites. The aim of the presented research was to clarify the effect of synthetic conditions and chemical composition of the preceramic nanopowders Si/C/N on their thermal stability under different atmospheres. A good insight into the species adsorbed onto the surface, the nature of chemical groups present in nanopowders and their reactivity during annealing may be used for further improvement of the colloidal processing, shaping and forming techniques, as well as for optimising the sintering conditions, thus improving the mechanical properties.

It was shown that the relative atomic concentrations of Si, C and N were primarily influenced by the types of precursors (gaseous: SiH_4 , CH_3NH_2 , NH_3 or liquid oligosilazane (HMDS: $(\text{CH}_3)_3\text{SiNHSi}(\text{CH}_3)_3$)) used for the laser synthesis process. Residual functionalities, C-H, N-H and Si-H bonds, were still present as supported by the identification of the volatile species by Mass Spectrometry. The difference in thermal behaviour was attributed to variations in the preceramic structure. The best thermal stability was exhibited by nanopowders prepared from gaseous precursors.

P.S.C.3.

**CHARACTERIZATION OF NANOPOROUS LANTHANIDES-DOPED YAG
POWDERS OBTAINED BY PROPELLANT SYNTHESIS**

R. Krsmanović¹, S. Polizzi¹, P. Canton¹, A. Speghini², M. Bettinelli²

¹Dipartimento di Chimica Fisica, Laboratorio di Microscopia Elettronica, Università Ca' Foscari di Venezia, Venice, Italy, ²Dipartimento Scientifico e Tecnologico, Università di Verona, Verona, Italy

In the present work, we explored the possibility of obtaining nanocrystalline powders of lanthanide-doped $\text{Y}_3\text{Al}_5\text{O}_{12}$ (YAG, yttrium aluminum garnets) using solution combustion (propellant) synthesis, a novel technique that has been proven to be capable of producing nanopowders at relatively low temperatures and in a rapid way for a number of oxides. A series of YAG samples containing a number of different trivalent lanthanide ions (Eu, Er, Ho) were produced. Samples were characterized by X-ray diffraction for phase identification and line broadening analysis, and electron microscopy, both SEM and HRTEM, for morphological and nanostructural investigation.

P.S.C.4.

LOW TEMPERATURE DEFORMATION OF NANOSTRUCTURED Cu AND Ti

E. D. Tabachnikova¹, V.Z. Bengus¹, V.D. Natsik¹, R.Z. Valiev², D.V. Gundarev², I. V. Alexandrov²

¹Institute for Low Temperature Physics and Engineering of NASU, Kharkov, Ukraine,

²Institute of Physics of Advanced Materials, USATU, Ufa, Russia

Bulk ultra fine grained (BUFG) nanostructured rods of commercially pure Cu and Ti with the different average grain sizes from 100 to 300 nm were manufactured by equal channel angular pressing (ECAP). Samples of the 2 x 2 x 7 mm dimensions were studied in the uniaxial compression with the $2.5 \cdot 10^{-4} \text{ s}^{-1}$ strain-rate at temperatures (T) 300, 77 and 4.2 K.

Activation volume γ for dislocation motion found from the strain-rate sensitivity (the strain-rate was varied from $2.5 \cdot 10^{-4} \text{ s}^{-1}$ to 10^{-3} s^{-1}) of the flow stress in the course of plastic deformation have been measured. Peculiarities of the ductile failure of nanostructured Ti at 77 and 4.2 K are studied.

It is established that at 4.2 and 77 K the yield stress values of BUFG Ti and Cu exceed several times the yield stress of initial coarse-grained polycrystals.

The plasticity resource of BUFG Cu at 77 and 4.2 K is not smaller than in ordinary polycrystalline materials; in BUFG Ti at 4.2 K it comes to 13 % in parallel to ECAP axis and to 5% for the perpendicular direction.

$\gamma(\varepsilon)$ dependences are analyzed for establishing contributions to deformation of the intragrain dislocation glide and the grain boundary sliding.

For nanostructured Ti the ductile shear failure along the plane, oriented nearly at 45 degree to the compression axis, was observed at 77 and 4.2 K. SEM fractography revealed some peculiarities of "vein" patterns at the failure surfaces. These are considered following from non-uniform adiabatic heating along the surface of shear failure owing to non-uniform internal stress distribution.

P.S.C.5.

SOL-GEL TITANIA COATINGS AS GAS SENSORS

Lj. Nikolić¹, V. Srdić¹, M. Bokorov²

¹Department. of Materials Engineering, Faculty of Technology, ²Department of Biology and Ecology, Faculty of Natural Sciences, University of Novi Sad, Serbia and Montenegro

Titania gas sensors have attracted considerable attention of scientists due to the simple structure, low cost and fast response to atmosphere change. This type of semiconducting oxygen sensors are based on their change in resistance according to the oxygen partial pressure of the surrounding atmosphere. In this paper, the preparation and characterization of nanocrystalline titania oxygen sensors are investigated. Sol-gel titania coatings have been prepared by dip coating method on different substrates. Titania sols were synthesized starting from titania-butoxide under different water contents and pH values. Sensor electrodes were prepared before coating of titania sols, by deposition of gold thin-film on the selected substrate by physical vapor deposition technique. The titania oxygen sensors were heat treated at different temperature up to 700°C and characterized by XRD and HRSEM. Results showed that the obtained titania nanostructures are proper for sensor application.

P.S.C.6.

THE ELECTROPHORETIC DEPOSITION OF BOEHMITE SOL ON THE TITANIUM

M. S. Lazić¹, V. B. Mišković-Stanković², Đ. T. Janačković², R. Petrović², Lj. M. Pavlović¹

¹Institute of Nuclear and Other Mineral Raw Materials, Belgrade, ²Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia and Montenegro

The electrophoretic deposition process performed from sols and colloidal suspensions of ceramic powders has many advantages in comparison to conventional ceramic powder processing methods. In this way it is possible to control the thickness and microstructure of sintered layers. The possibility of making homogeneous boehmite (AlOOH) layers on titanium with controlled thickness was investigated. The deposition process was performed from water boehmite sol at different values of applied voltage, deposition time and temperature. It was shown also that titanium pretreatment has the influence on the thickness and morphology of deposited boehmite coatings. On the other hand, the increase in applied voltage increases the amount of evolved hydrogen. As a consequence, boehmite layer has a great number of cracks, which can be detected using SEM method.

P.S.C.7.

THE EFFECT OF VARIOUS PARAMETERS ON STRUCTURE OF W-Ti THIN FILMS

S. Petrović, B. Gaković, Z. Rakočević, T. Nenadović

Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro

The intermetallic tungsten-titanium (W-Ti) alloy is a structural material with attractive properties, such as high melting temperature, good oxidation resistance and thermo chemical stability. The polycrystalline W-Ti alloy thin films were deposited by d.c. sputtering from W(90%)-Ti(10%) w.t. target in Ar discharge. These thin films were deposited on different substrates: single crystal silicon orientation (100) and polycrystalline austenitic stainless steel and aluminium. Structural analysis were carried out with X-ray diffraction and scanning tunneling microscope. Microstructural features - grain size and surface roughness – depended on substrate properties and thickness of deposits. The crystal structure of W-Ti thin films remained the same as the structure of W, although the presence of Ti gives rise to the expansion of the α -tungsten lattice. Results of investigation system W-Ti-substrate are important as indicate changes of the structure which are correlated with their other properties and possibility of use.

P.S.C.8.

EPR STUDY OF MANGANESE IN $\text{Cd}_{1-x}\text{Mn}_x\text{S}$ QUANTUM DOTS

B. Babić Stojić, D. Milivojević, M. Čomor,

Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

$\text{Cd}_{1-x}\text{Mn}_x\text{S}$ quantum dots (QDs) of average size 4.5 nm with manganese concentration from $x = 0.001$ to $x = 0.30$ have been prepared using aqueous solution precipitation. The EPR measurements have been performed at 9.5 GHz spectrometer in the temperature range 20 – 290 K. Two structures in the EPR spectra are observed for all the manganese concentrations, a hyperfine structure and a broad EPR line. The hyperfine structure is described by allowed and forbidden hyperfine transitions of the Mn^{2+} ion central sextet with hyperfine splitting constant $|A| \approx 9.6$ mT and with axial field splitting parameter $D \approx 12$ mT. The hyperfine structure is attributed to the isolated Mn^{2+} ions at or near the surface of nanocrystals. The width of the broad resonance and its temperature independence suggest that the wide line originates from the noncentral transitions broadened by crystal field effects, as in some disordered materials.

P.S.C.9.

LASER INDUCED SYNTHESIS OF ULTRAFINE TiO₂ POWDERS

Z. D. Dohčević-Mitrović, M. J. Šćepanović, I. I. Hinić, G. M. Stanišić

Institute of Physics, Belgrade, Serbia and Montenegro

A laser-induced process for the synthesis of ultrafine TiO₂ powders starting from liquid precursors has been developed using cw CO₂ laser as an excitation source. This work is mainly concerned to the evaluation of the role of the main process parameters on powder composition, reaction efficiency and production rate. These parameters strongly influence and change the reaction temperature which affects the size, stoichiometry and crystallinity of the powder particles. The powder composition was investigated using IR reflection and Raman spectroscopy methods and the particle size was determined by low-frequency Raman scattering and SEM method.

P.S.C.10.

PHONON THERMODYNAMICS OF SUPERLATTICES

S.K. Jaćimovski¹, J.P. Šetrajčić¹, B.S. Tošić¹, V.D. Sajfert²

¹Department of Physics, Faculty of Sciences, University of Novi Sad

²Technical Faculty "M.Pupin" Zrenjanin, University of Novi Sad, Serbia and Montenegro

Phonon spectra as well as thermodynamic characteristics of superlattices are analyzed using the method of two-time temperature dependent Green's functions. The phonons have energy gap in spectra. Besides energy spectra, the density of states was calculated. It was shown that the Debye's frequencies are lower than in bulk structures. Due to this the macroscopic characteristics of superlattices differ from those of bulk. The temperature dependence of specific heat of superlattices is compared to specific heat of thin film. It was found that they are approximately equal and considerably lower than specific heat of bulk structures. The consequences of this fact to the thermal, conducting and superconducting properties of materials have been discussed.

P.S.C.II.

MICROSTRUCTURAL CHARACTERIZATION OF Mg-C NANOCOMPOSITES

A. Montone¹, M. Vittori Antisari¹, J. Grbović², E. Bonetti³, L. Pasquini³, A. Bassetti³, A. Fiorini³

¹Materials and Technology Unit, ENEA C.R. Casaccia, Roma, Italy

²Institute of Nuclear Sciences "Vinča", Department of Material Science, Belgrade, Serbia and Montenegro, ³Department of Physics, University of Bologna and INFN

Recently, there has been an increasing interest in developing materials with nanocrystalline structure to improve atomic mobility, which can play a main role on the tailoring of properties suitable for hydrogen storage. Nowadays these materials often are magnesium based, owing to the low cost, low weight and high hydrogen capacity. However magnesium is hard to activate, its temperature of operation is high and the hydrogenation/dehydrogenation kinetics are slow. The mechanical processing of magnesium powders by ball milling has been shown to improve most of such properties. The absorption-desorption kinetics result faster, due to the peculiar metastable microstructure, characterised by high volume fraction of surfaces-interfaces and a high defects density. Moreover hydrogen sorption can be further accelerated by catalyst addition and easier activation could be achieved by a multicomponent Mg-based system. We have investigated magnesium carbon nanocomposite materials for hydrogen storage obtained by mechanical milling for different times graphite and magnesium with different portion of benzene, acting as a lubricant. These materials have been characterized by X-ray diffraction, SEM observations and DSC following milling and hydrogenation.

P.S.D.1.

CHARACTERIZATION OF COLD-ROLLED CU-NB COMPOSITE

A. Ishmaku, K. Han

National High Magnetic Laboratory, Florida State University, Tallahassee, Florida, USA

Copper –18wt% Niobium composite is studied as one of high strength conductors, which offers great potential for substantial improvements in performance of high field magnets. These conductors are usually produced via heavy deformation of certain metal-metal composites, in which both matrix and fiber are deformable. The hardness of this composite after rolling at room temperature and heat treatment at 300°C three times are examined. The cold-rolled produced hardness of 274HV at room temperature. The physics of the co-deformation in this system is complicated by the fact that two phases have different crystal structure, Niobium b.c.c and Copper f.c.c. X-ray diffraction crystallographic macrotexture analysis shows deformation results in production of $\{110\}<111>$ and $\{111\}<110>$ texture at Nb and Cu respectively. Twinning occurs on $\{111\}<112>$ system ($\varphi_2=45^\circ$, $\Phi=55^\circ$, $\varphi_1=90^\circ$) at Cu.

P.S.D.2.

THE BEHAVIOR OF $\pm 55^\circ$ FILAMENT-WOUND GLASS-FIBER/EPOXY-RESIN TUBES UNDER COMBINED TENSILE AND INTERNAL PRESSURE LOADING

F. Thiebaud¹, P. Robinet¹, R. Aleksić², P.S. Uskoković², D. Perreux¹

¹Laboratoire de Mécanique Appliquée R. Chaléat, Besançon, France

²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

Filament-wound polymer-matrix composite tubes are becoming an important class of engineering materials for a wide range of applications, such as high-pressure containers in chemical plants, gas and fluid transfer pipes in the gas, oil and nuclear industries. Laboratory made tubes with a filament winding pattern of $\pm 55^\circ$ were tested under various combinations of hoop and axial stresses to evaluate the mechanical behavior under pure tensile load, pure internal pressure and under combined loading. The resulting stress-strain curves were analyzed and biaxial failure envelopes in terms of stress and strain were constructed, demonstrating the complexity of the composite tube behavior. These findings were enriched by comparing with fractographic observations of failure modes.

P.S.D.3.

HOT PRESSING OF $\text{Si}_3\text{N}_4/\text{Si}_3\text{N}_4$ COMPOSITES

D. Bučevac, S. Bošković

Institute of Nuclear Sciences Vinča, Materials Science Laboratory 170, Belgrade, Serbia
and Montenegro

$\text{Si}_3\text{N}_4/\text{Si}_3\text{N}_4$ composites were obtained by introducing $\beta\text{-Si}_3\text{N}_4$ seeds into the $\alpha\text{-Si}_3\text{N}_4$ matrix. $\beta\text{-Si}_3\text{N}_4$ seeds were obtained from mixture of Y_2O_3 , SiO_2 and $\alpha\text{-Si}_3\text{N}_4$, which was heating at 1850°C , for 6 hours in flowing nitrogen. The preparation of seeds from mentioned samples was described. Two types of additives were used as densification aids: $\text{Y}_2\text{O}_3\text{-Al}_2\text{O}_3$, as well as Y_2O_3 in the quantity of 10 mass%. Homogenization of seeds and previously prepared mixture with additives (in vibro mill) was performed in attritor in isopropanol, for 6 hours. The concentration of seeds varied from 1-5 mass%. Hot pressing was performed at 1700 and 1800°C under the pressure 39 MPa in flowing nitrogen. Isothermal heating time ranged from 1-6 hours. Densification degree, during hot pressing, according to our results, was affected by additive type and seeds concentration. Isothermal heating time did not affect density change to a great extent. Microstructure was affected both by isothermal heating time and by the type of the liquid phase. The phases present were detected by X-ray analysis. Hardness and fracture toughness were determined by indentation method. These results will be discussed, as well.

P.S.D.4.

INCREASED STABILITY OF C/C-COMPOSITE TOWARD CATALYTIC OXIDATION

A. Devečerski¹, J. Grbović¹, Z. Laušević¹, N. Petranović²

¹Institute of Nuclear Sciences Vinča, Belgrade, ²Faculty of Physical Chemistry, Belgrade,
Serbia and Montenegro

Major weakness of all carbon based materials lies in their poor oxidative stability. Most of the common protection methods are based on the formation of protective coating(s) on the finished parts. This approach can be effective in cases where work conditions induce low material wear only, but in case of high material wear (i.e. friction materials), this coating(s) may be damaged and became inefficient in protecting the material from oxidation. Main purpose of this work was to increase the oxidative stability, and find the simplest way for bulk doping of matrix with boron, in order to achieve a carbon/carbon (C/C) composite material, which will have same oxidative stability at every point of bulk material. C/C-composite is made from glassy carbon (GC) as a matrix and discontinuous carbon fibers (CF) as a reinforcing component. Oxidative stability was investigated by a non-isothermal thermogravimetric analysis (atmosphere of flowing air), for doped and undoped specimens. Additionally, oxidative stability of these specimens was investigated in the presence of a catalyst (sodium acetate), which is commonly used as deicer on the roads and airports, where carbon based frictional materials operate. Observed higher oxidative stability of doped composite in the presence of a catalyst was discussed, and possible reaction mechanism to explain such a behavior is given.

P.S.D.5.

SYNTHESIS OF SELF-REINFORCED Si_3N_4 BASED COMPOSITES WITH CeO_2

A. Vučković, S. Bošković

Materials Science Laboratory, Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro

Composite materials on the basis of Si_3N_4 were synthesized by introducing previously prepared β - Si_3N_4 seeds, into the mixture of α - Si_3N_4 (LC12SX- Starck) with additive. The procedure for seeds preparation was described in detail. Additive used for sintering of composites was: CeO_2 , in the amount of 10 mass %. Homogenization of seeds and starting mixture was performed in attritor. Green pellets were obtained by prepressing and thereafter by isostatic pressing under the pressure of 350 Mpa. Sintering of green pellets was performed at 1800°C, for 1, 2, 4 and 6 hours in flowing nitrogen. Powder bed technique was used to prevent thermal decomposition of Si_3N_4 .

Characterization of sintered samples involved phase analysis by X-Ray diffraction, density measurement by Archimedes method as well as hardness and fracture toughness measurements by indentation method. Densification process development and fracture toughness as a function of sintering time will be discussed.

P.S.D.6.

UNDERPOTENTIAL DEPOSITION OF HYDROGEN ON Pt₃Mo ALLOY IN ACID SOLUTION TEMPERATURE-DEPENDENCE

J. Jakšić, Lj. Vračar, N. Krstajić,

Faculty of Technology and Metallurgy, University of Belgrade, Serbia and Montenegro

The strength of the metal-hydrogen bond should play an important role in determining the mechanism and kinetics of the cathodic hydrogen evolution reaction. That is why the electrocatalysis in this reaction can be comparatively characterized at various metals by a volcano-shaped curve relating logarithm of the exchange current density to the bond energy of H chemisorbed to the metal or standard Gibbs energy of chemisorption of H.

Potentiodynamic studies of the underpotential deposition of hydrogen (H_{upd}) on Pt₃Mo electrode in 0.5 mol dm⁻³ HClO₄ aqueous solution at the range of temperature from 275 K to 317 K are made and thermodynamic state functions for the hydrogen adsorption are determined.

Theoretical treatment of the experimental results is derived from H_{upd} electrochemical adsorption isotherm. It is determined that $\Delta G^{\theta}_{\text{ads}}(H_{\text{upd}})$ as a function of temperature varies with the surface coverage from -19.5 kJ mol⁻¹ ($\theta = 0$) to -9.5 kJ mol⁻¹ ($\theta = 0.2$). The increase of $\Delta G^{\theta}_{\text{ads}}(H_{\text{upd}})$ toward less negative value indicates the repulsive interactions between H_{upd} adatoms. From the temperature dependence of the Gibbs energy of adsorption the enthalpy and entropy of adsorption are calculated. The values of these functions are determined to be $\Delta H^{\theta}_{\text{ads}}(\theta=0) = -60.9$ kJ mol⁻¹ and $\Delta S^{\theta}_{\text{ads}}(\theta=0) = -280$ J mol⁻¹K⁻¹. The value of $\Delta H^{\theta}_{\text{ads}}$ allowed determinations of the bond energy between electrode surface and H_{upd} that is found to be $E_{\text{M-H}} = 273$ kJ mol⁻¹ for $\theta = 0$. The lateral repulsion interactions are the reason why M- H_{upd} bond energy decreases significantly with increase of coverage so, the saturation coverage is less than 1 in the UPD potential region.

P.S.D.7.

STUDY OF THERMAL STABILITY OF COMPOSITES PS/ SEMICONDUCTOR PARTICLES

J. Kuljanin, M.I. Čomor, J.M. Nedeljković

Vinča Institute of Nuclear Sciences, Belgrade, Serbia and Montenegro

The thermal stability of composites polystyrene (PS) / semiconductor particles (CdS, Fe₂O₃) with various compositions has been investigated. The characteristic thermal degradation temperatures, as the measure of thermal stability, were determined by thermogravimetric analysis. Improvement of the thermal stability of the composites PS/ semiconductor particles with respect to the pure PS matrix is demonstrated for all compositions. The kinetics of the degradation process of composites and pure PS matrix have been characterized by calculating activation energy using theoretical models (Ozawa, Kissinger) from experimental thermogravimetric data.

P.S.D.8.

MAGNETIC FIELD SENSING BY OPTICAL FIBERS WITH COMPOSITE COATING

V. Radojević¹, D. Nedeljković², N. Talijan², R. Aleksić¹

¹Faculty of Technology and Metallurgy, Belgrade,

²Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia and Montenegro

The change in the optical path length of optical fiber with composite coating in the presence of a magnetic field provides the fiber with sensitivity to a magnetic field. The sensed parameter- magnetic field acts upon the magnetic particles present in the polymer coating layer of the optical fiber in such a way that the action modifies the optical propagation characteristics of the optical fiber.

The commercial multi-mode optical fiber was coated with magnetic composite. The composite coating was formed with dispersions of permanent magnet powders of SmCo₅ or NdFeB in poly (ethylene-co-vinyl acetate)-EVA solutions in toluene. The influence of the applied external magnetic field on the change of intensity of the light signal propagate through developed optical fibers were investigated. In this paper the influence of type of the magnetic powder and particles size on the optical propagation characteristics of the optical fiber were particularly investigated.

P.S.D.9.

THE EFFECTS OF STRUCTURE CHARACTERISTICS ON MECHANICAL PROPERTIES OF ALUMINUM ALLOY MATRIX COMPOSITES

Ž. Gnjiđić, A. Devečerski, O. Erić, V. Rajković, D. Božić

Institute of Nuclear Sciences "Vinča", Material Sciences Laboratory, Belgrade, Serbia and Montenegro

Abstract-Composite materials based on the alloy CW67 (Al base matrix) and volume fraction of 15 pct of SiC particles in two nominal sizes (0,7µm and 33µm) have been produced by hot pressing. The fracture behavior of the composite and the monolithic alloy was studied under uniaxial compressive loading at room temperature. Detailed microstructure characterization of hot pressed monolithic alloy and composite has been evaluated by optical and scanning electron microscopy (SEM). SEM examined the topography of fracture surfaces of composite. It was found that the large reinforcement particles and clusters of reinforcement particles could have a major effect on the mechanical properties of the composite materials.

P.S.D.10.

THE INFLUENCE OF NANO AND MICRO SILICA ON THERMAL STABILITY OF ELASTOMERES BASED ON CR, NBR AND CSM RUBBERS

G. Marković¹, B. Radovanović², M. Marinović-Cincović³, J. Budinski-Simendić⁴

¹Rubber Products Enterprise "Tigar", Pirot, ²Faculty of Science, Niš, ³Institute of Nuclear Sciences Vinča, Belgrade, ⁴Faculty of Technology, Novi Sad, Serbia and Montenegro

Many attempts have been made to explain reinforcement of a rubber when fillers are added. In the case of silica, several approaches have been used to explain its influence of material properties based on relevant dimensions in rubber-filler interactions: elementary particle (2-20 nm), string of pearls structure (100-150 nm) or clusters due to interparticle hydrogen bonding (10^3 – 10^5 nm). We have been studied cross-linked materials based on CR, NBR and CSM rubbers reinforced by nano and micro fillers. Active precipitated silica with particle size 15 nm and diatomaceous earth with 28 μ m were used for rubbers and its blend (NBR/CSM; CR/CSM). The fracture surface of materials cross-linked in the presence of sulphur, ethilenthiourea and magnesium oxide was examined by SEM. Thermal stability in oxygen was studied by TGA. The FTIR method (with ATR supplement) confirmed the strong SiO-C interaction at 1079 cm^{-1} for NBR/CSM and CR/CSM systems reinforced by nano sized silica.

P.S.D.11.

ACTIVATION ENERGY OF CROSSLINKING AND DEGRADATION PROCESESS OF ETHYLENE-PROPYLENE-DIENE RUBBER CROSS-LINKING SYSTEMS DETERMINED BY RHEOMETER

S. Samardžija Jovanović¹, V. Jovanović¹, G. Marković²

¹Department of Chemistry, Faculty of Science, University of Priština, Kosovska Mitrovica,

²Rubber Products Enterprise "Tigar", Pirot, Serbia and Montenegro

When compounding of elastomer we are choice some macromolecules and crosslinking them using crosslinking agents. These materials have been used in specific conditions with application of different deformation. In rubber industry laboratories, the standard Rheometer machine for both crosslinking and degradation processes have been used for determination of activation energy. The crosslinking and degradation processes determined elastomer for compounding.

Results are showing that chemical kinetic of two high temperature curve determined activation energy crosslinking and degradation processes. This method (faster, simplicity and cheapest) gives a new dimension of Rheometer application in rubber industry.

P.S.D.12.

**THE ANTI-CORROSIVE CHARACTERIZATION OF STEEL PROTECTED USING
THE ACTIVE-PASSIVE METHOD**

M. Purenović, M. Miljković, A. Zarubica

Faculty of Mathematics and Natural Sciences, Niš, Serbia and Montenegro

In this experiment the active-passive anticorrosive protection of steel was performed. It consisted of the following operations: preparation of samples surfaces, the metallization process, application of surface coating and the testing of anticorrosive features of obtained coatings on the samples surfaces. The metallization of prepared samples was performed with the use of the hand pistol that operated with metal wire "Protector" Ø 3.18 mm of electrochemical active anode material prepared on the basis of microalloyed aluminum. After this process surface coating based on the epoxy resin was applied. The final experimental operation was electrochemical study of whole composition steel-"Protector"-organic coat of paint by measuring of change of electrochemical potential of galvanic team in 20 % NaCl solution during the time. The obtained results show that the active-passive protection is the very good method of protection against corrosion, but on condition that minimally sufficient potential of metallized layer is provided (about 200-300 mV more negative than the steel protective potential).

P.S.E.1.

**ANTIMICROBIAL AND ANTITUMOR ACTIVITY OF USNIC ACID HYDRAZONES
AND THEIR Cu(II) AND Pd(II) COMPLEXES**

M. Natić, D. Sladić, Ž. Tešić, K. Andelković

Faculty of Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro

Usnic acid is a lichen natural product which has interesting biological effects. In this work, antimicrobial and antitumor activities of the usnic acid derivatives: usnic acid 11-(octanoylhydrazone) (**I**), usnic acid 11-(thiosemicarbazone) (**II**) and usnic acid 11-(isonicotinoylhydrazone) (**III**) and their Cu(II) and Pd(II) complexes were tested. The results show that complexes have higher antibacterial and cytotoxic activity than the corresponding usnic acid derivatives. Both ligands and complexes were active against Gram-positive bacteria, but showed no activity against Gram-negative bacteria. Cu(II) complexes showed higher cytotoxic activity than Pd(II) complexes. Pd(II) complex with (**I**) showed significant antifungal activity, particularly interesting because both the ligand and K₂[PdCl₄] were completely inactive.

P.S.E.2.

**SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF BIS HYDRAZONE OF
OXALOHYDRAZIDE AND 2-ACETILPYRIDINE AND ITS Zn(II) COMPLEX**

K. Andelković, N. Filipović, D. Jeremić, D. Sladić

Faculty of Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro

As part of the study of biological activity of transition metal complexes with hydrazone and hydrazide ligands, a new ligand N',N''-bis[(1*E*)-1-pyridin-2-yl]ethylidene]ethanedihydrazide and its Zn(II) complex were synthesized. The structures of the ligand and the complex were determined using elemental analysis, IR, ¹H NMR and ¹³C NMR spectra, and molar conductivity measurements. The complex has octahedral geometry with one ligand molecule coordinated as a tridentate in monoanionic form. The remaining three coordination sites are occupied by water molecules, and perchlorate anion is in the outer sphere of the complex.

P.S.E.3.

INVESTIGATION OF THERMAL BEHAVIOUR OF TRANSITION METAL COMPLEXES WITH HYDRAZONE AND HYDRAZIDE DERIVATIVES OF 2,6-DIACETILPYRIDINE

V. Radulović¹, K. Andelković², D. Minić³

¹Institute of Chemistry, Technology and Metallurgy, Department of Chemistry, Belgrade,

²Faculty of Chemistry, University of Belgrade, Belgrade,

³Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia and Montenegro

Thermal behaviour of Cu(II), U(VI), Mn(II) and Ni(II) complexes with 2',2''-(2,6-pyridinediyl-diethylidene) dioxamohydrazide and Cu(II) and Co(II) complexes with 2,6-bis[1-(methoxycarbonylmethyl-hydrazono) ethyl]pyridine was studied by DSC and TG analysis, in the temperature range of 20°C-600°C in the stream of nitrogen. Depending on the structure of complexes, thermal degradation occurred mostly in the range of 200°C-400°C, proceeded by loss of crystal and coordinated water if present. Kinetic processes of degradation were studied by analysis of DSC and TG curves recorded at one or more heating rates. Based on the activation energies, determined in this way, thermodynamic parameters of activated complexes were also determined. Mechanisms of degradation processes were established using the obtained data.

P.S.E.4.

SYNTHESIS, PHYSICO-CHEMICAL AND ANTIBACTERIAL CHARACTERISTICS OF Cu(II) COMPLEXES WITH PYRIDOXAL SEMICARBAZONE

V. S. Jevtović¹, V. M. Leovac¹, S. Markov², J. Simeunović³

¹Department of Chemistry, Faculty of Sciences, Novi Sad, ²Faculty of Technology, Novi Sad,

³Department of Biology, Faculty of Sciences, Novi Sad, Serbia and Montenegro

In contrast to metal complexes with pyridoxal thiosemicarbazone, which have been subject of studies in the course of recent twenty years, the complexes with pyridoxal semicarbazone (SCPx) have attracted attention of researchers only in the most recent time.

As a continuation of our studies of complexing properties of SCPx as ligand, this work is concerned with the synthesis and some physico-chemical characteristics of its complexes with different Cu(II) salts of the general formula Cu(SCPx)X₂·nH₂O (X = Cl, NO₃, NCS, ½ SO₄), as well as with the complexes involving dianionic form of the ligand, Cu(SCPx-2H)NH₃·H₂O and Cu(SCPx-2H). All the complexes are green crystalline substances having normal μ_{eff} values for Cu(II), the exception being Cu(SCPx-2H), which has a somewhat lower μ_{eff} value compared with the system S=1/2. In addition to elemental analysis and magnetochemical measurements, all complexes were characterized by measuring molar conductivity and recording IR spectra. Besides, the ligand and Cu(SCPx)Cl₂ were tested on some gram-positive and gram-negative bacteria.

P.S.E.5.

CONFORMATIONAL ANALYSIS OF OCTA- AND TETRAHALOGENATED TETRAPHENYLPORPHYRINS AND THEIR METAL DERIVATIVES

S. Grubišić¹, M. Gruden-Pavlović², S. R. Niketić²

¹Institute of Chemistry, Technology and Metallurgy, Belgrade, ²Faculty of Chemistry,
University of Belgrade, Belgrade, Serbia and Montenegro

Significant nonplanar distortions of the porphyrin macrocycle, observed in X-ray crystal structures of most hemoproteins, are believed to have important biological relevance. We have been studying the effects of the peripheral substitution with three series of octa- and tetrabromo tetraphenyl porphyrins without metal, and with Ni(II) and Tb(III) as representative small and large metal ions.

Molecular energy optimization calculations were carried out using the CFF program, with the parameters developed previously. The conformers obtained by MM calculations are stereochemically characterized, compared with available X-ray structures and with the conformers obtained in our previous MM study with chloro instead of bromo halogen substituents.

P.S.E.6.

BIOPROCESSING OF POLYESTER FIBERS

D. Đorđević, M. Novaković, D. Trajković

Faculty of Technology, Leskovac, Serbia and Montenegro

In the textile industry, polyester has certain key advantages including high strength, soft hand, stretch resistance, stain resistance, machine washability, wrinkle resistance and abrasion resistance. However, polyester is not so optimal in terms of its hydrophobicity, pilling, static, dyeability, inactive surface as a medium for adhering, i.e., softening or wettability enhancing compounds. We have investigated the effects of hydrolysis on this fabric by varying the conditions of treatment, i.e., time of treatment. We have used polyester fibers, in this study: the homopolymer poly(ethylene terephthalate). We use three lipases. Two of the three lipases improve the water wetting and absorbent properties of regular a polyester fabric more than alkaline hydrolysis. The process does not probably cause major damages of the fibre surface or major reorganisation of the surface layers of the polyester fibres, so therefore their mechanical characteristics are satisfactory. Two of the three lipases significantly improve the water penetration and absorbent properties of regular polyester fabric.

P.S.E.7.

BIODEGRADABLE ALIPHATIC POLYESTERS WITH HYDROPHILIC SOFT SEGMENTS

D. Pepić, M. S. Nikolić, J. Donlagić

Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

Aliphatic polyesters are one of the most promising biodegradable synthetic polymers. Some higher melting point aliphatic polyesters, like poly(butylene succinate), have high crystallinity and low hydrophilicity, which interfere with their smooth degradation. The incorporation of hydrophilic polyether segments into the backbone of these polymers could increase their biodegradability and modify their mechanical properties. In this paper the synthesis and characterization of poly(butylene succinate) copolymerized with poly(ethylene oxide) (PEO-series) and poly(tetra methylene oxide) (PTMO-series) as soft hydrophilic segments, will be presented. The content of soft segments was varied from 10 to 50 mass % in both series. The molecular weights of the PEO and PTMO were the same (1000 g/mol). The copolyesters were synthesized by transesterification reaction in the bulk. ¹H NMR spectroscopy was used to determine the composition of the polyesters. The molecular weights of the polyesters were evaluated from solution viscosity measurements. Their thermal properties were investigated by means of DSC measurements. The effect of the copolymer composition on the physical and thermal properties, as well as enzymatic and hydrolytic degradation was investigated.

P.S.E.8.

INVESTIGATION OF THE INFLUENCE OF THE HYDROPHOBING OF HAp ON THE CROSSLINKING OF PDMS/HAp COMPOSITES

J. Jovanović¹, B. Adnađević², M. Kićanović³, N. Ignjatović¹, D. Uskoković¹

¹Institute of Technical Sciences of SASA, Belgrade, ²Faculty of Physical Chemistry, Belgrade,

³Institute of General and Physical Chemistry, Belgrade, Serbia and Montenegro

Surface of hydroxyapatite (HAp) was modified by the action of various hydrophobic agents, based on silanol-containing and stearate-containing compounds. Modified HAp samples were used for preparing polysiloxane/hydroxyapatite composites. PDMS/HAp composites were formed directly in the cell of the DSC calorimeter, and cross-linking process was investigated *in situ*. Influence of the type and concentration of the hydrophobic agent on the thermodynamic and kinetic parameters, as well as on the mechanism of the PDMS/HAp composites cross-linking process was investigated. It was determined that HAp modified with silanol-agents leads to not very important changes in the cross-linking process, while HAp, modified with stearate-containing compounds, completely changes the mechanism of the investigated process.

P.S.E.9.

SYNTHESIS AND CHARACTERIZATION OF POLY(ITACONIC ACID) AND POLY(ETHYLENE GLYCOL) COMPLEXES

S.Lj. Tomić¹, M.T. Kalagasidis Krušić¹, E.S. Džunuzović², J.M. Filipović¹

¹Faculty of Technology and Metallurgy, Belgrade University,

²Institute of Nuclear Sciences "Vinča", Belgrade, Serbia and Montenegro

Poly(itaconic acid) /poly(ethylene glycol) complexes (PIA / PEG) complexes were prepared by two different procedures: simple mixing of preformed PIA and PEG and template polymerization of itaconic acid in 0.1 M HCl in the presence of linear poly(ethylene glycol). Complex formation was attributed to hydrogen bonding between the carboxyl group of PIA and the ether group of PEG. The stability of complexes is more pronounced in acidic media (pH less than 4.5) due to low ionization of PIA carboxylic groups. Two types of complexes were characterized by DSC, TGA, FTIR, NMR and viscometry measurements. Our results indicate that complexes prepared by template polymerization have a more ordered structure.

P.S.E.10.

SWELLING KINETICS OF ACRYLAMIDE - ITACONIC ACID COPOLYMER HYDROGELS

M. Kalagasidis Krušić¹, S. Tomić¹, E. Džunizović², J. Filipović¹

¹Faculty of Technology and Metallurgy, University of Belgrade, Belgrade,

²Institute of Nuclear Sciences Vinča, Belgrade, Serbia and Montenegro

Hydrogels are slightly crosslinked hydrophilic polymer networks which do not dissolve but can swell to a high extent in water. Anionic polymeric networks are stimuli responsive, demonstrating a large volume transition as a function of pH.

Good mechanical properties, required for the use of these materials in medicine and pharmacy, are obtained with semi-interpenetrating polymer networks (semi IPN), where the network is formed in the presence of a linear polymer.

In this work, two series of polyacrylamide and poly(itaconic acid) copolymers were synthesized in the presence of : PVP and PVA. All samples were characterized by swelling kinetics, IR spectra and thermal behaviour.

P.S.E.11.

CRYSTALLIZATION MECHANISM OF $\text{CaO-P}_2\text{O}_5\text{-V}_2\text{O}_5$ GLASS

V.D. Živanović¹, M.B. Tošić¹, S.R. Grujić², J.D. Nikolić¹

¹Institute for Technology of Nuclear and Other Mineral Raw Materials, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

Previous studies have been shown that in general, the surface mechanism of crystallization is dominant for the phosphate glasses. Due to the addition of different oxides in the base system the complex crystallization behaviour of these glasses can occur. To determine the dominant crystallization mechanism of $\text{CaO-P}_2\text{O}_5\text{-V}_2\text{O}_5$ glass with molar ratio $[\text{CaO}]/[\text{P}_2\text{O}_5] > 1$, the DTA method was used. In this method, either the maximum height of the DTA crystallization peak $(\delta T)_p$ or the ratio $T_p^2 / (\Delta T)_p$, where T_p is the temperature at $(\delta T)_p$ and $(\Delta T)_p$ the peak half width is plotted as a function of glass particle size. The results of DTA measurement show that the parameters $(\delta T)_p$ and $T_p^2 / (\Delta T)_p$ decrease with increasing particle size which indicate the surface mechanism of crystallization of this glass. It was confirmed by SEM analysis of isothermally treated glass sample at T_{op} temperature.

P.S.E.12.

CRYSTALLIZATION KINETICS OF INVERT PHOSPHATE GLASS

M.B. Tošić¹, V.D. Živanović¹, N.S. Blagojević², J.D. Nikolić¹

¹Institute for Technology of Nuclear and Other Mineral Raw Materials, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, Serbia and Montenegro

The glasses in the $\text{CaO-P}_2\text{O}_5$ system are interesting because of their potential use as biomaterials. Studies of the crystallization behaviour of phosphate glasses till now have indicated their specificities regarding crystal nucleation and growth. The reason for such behaviour may be found in their structure. Previous studies have shown that an efficient way for obtaining high quality glass-ceramics is the addition of selected nucleating agents, the role of which is very complex. In this paper the crystallization ability of $\text{CaO-P}_2\text{O}_5$ invert glass with addition of 8 mol% V_2O_5 was investigated. Investigations were performed at non-isothermal conditions with glass powder granulation of 0.5-0.63 mm. The results of XRD shown that the α -calcium pyrophosphate ($\alpha\text{-Ca}_2\text{P}_2\text{O}_7$) was crystallized as the main phase. Investigation of the crystal morphology showed that these crystals grow in the form of dendrites with well-manifested anisotropy. The activation energy of $\alpha\text{-Ca}_2\text{P}_2\text{O}_7$ crystal growth of $E_a = 390 \pm 24$ kJ/mol and Avrami parameter of $n = 1.15$ were determined. Such results are an indication of diffusion controlled growth, proceeding on atomically smooth faceted crystal/glass interface.

P.S.E.13.

OPTICAL REFLECTANCE AND THE FINGERTIP

B.R. Jovanić¹, M. Dramićanin², L.B. Davidović³

¹Institute of Physics, Center of Experimental Physics, Zemun, ²Institute of Nuclear Sciences
"Vinča," Laboratory for Radiation Chemistry and Physics, Belgrade,

³Institute for Cardiovascular Diseases, UCC, Belgrade, Serbia and Montenegro

We performed *in vivo* optical reflectance measurements of human fingertips. Results from a large population reveal strong relation between reflectance intensity on 680 nm and human age and smoking condition. The relation exhibits nonlinear intensity increase with age having maximum at about 31-32 years for nonsmokers. Also, reflectance difference between smokers and nonsmokers has been identified with significantly greater reflectance observed with smokers.

P.S.E.14.

CHEMICAL STABILITY INVESTIGATION OF DENTAL PROSTHETIC MATERIALS IN ORAL FLUID AND WEAKLY ACIDIC SOLUTIONS

R.S. Nikolić, B. Kaličanin, G.M. Nikolić

Department of Chemistry, Faculty of Sciences, Niš, Serbia and Montenegro

In dental prosthetic practice a wide range of materials (dental ceramics, dyes, metallic crown carriers) is employed because of both reconstructive and aesthetic properties. Dental prosthetic implants are going to stay in oral cavity for a long period of time exposed to the corrosive action of oral fluids and food. Under such conditions there is a possibility for metal ions (some of them highly toxic) to be released from matrix and to be transported to the various parts of the human body. We investigated chemical stability of some commercially available dental prosthetic materials in oral fluid and weakly acidic solution. Conditions have been optimized for determination of lead, zinc, copper, and cadmium by potentiometric stripping analysis (PSA). By using PSA method we found that 0.2-6 ppm of lead, 0.4-300 ppm of zinc, and less than 10 ppm of copper was released during 24 h from various samples, but no cadmium was detected. These results were proved by using atomic absorption spectrometry (AAS).

P.S.E.15.

POLARITY OF POLYMER BIOMATERIALS AND CATALYTIC ASPECTS OF *In vivo* DEGRADATION

M. B. Plavšić¹, M. M. Plavšić¹, P. Putanov²

¹Faculty of Technology and Metallurgy, Belgrade

²Serbian Academy of Sciences and Arts, Belgrade, Serbia and Montenegro

Biomaterials used for implants and able to degrade in a predictable period of time, and in that way open space for new tissue which grows are considered as a kind of intelligent materials of very high importance. The nature of chemical structure of a polymer determines the degradability, where physical properties of the polymer sample, in parallel with a method of degradation affect the rate of degradation. But, their degradation in body liquids is in fact catalytic process controlled by enzymes. The biodegradation of organic, water insoluble polymers is a heterogeneous reaction. The size, shape, surface area and surface texture, greatly affect the rate of degradation. Unfortunately, there has not been enough systematic study in this area to form any general conclusion. Recent results on fine structure of active site cavity indicate importance of polarity in substrate - enzyme interactions. In this contribution are considered interactions of polymer side groups of different polarity with amino acid residues found in active site cavities, depending on changes of conformational relations.

P.S.E.16.

FTIR STUDY OF THE INFLUENCE OF MECHANOCHEMICAL TREATMENT ON HYDROXYAPATITE/POLY-L-LACTIDE AND HYDROXYAPATITE/POLY-L-LACTIDE/COLLAGEN COMPOSITES

I. Nikčević¹, D. Maravić², N. Ignjatović¹, N. Paunović³, N. Romčević³, D. Uskoković¹

¹Institute of Technical Sciences of SASA, Belgrade, ²Faculty of Physical Chemistry, University of Belgrade, Belgrade, ³Institute of Physics, Belgrade, Serbia and Montenegro

Hydroxyapatite/poly-l-lactide (HAp/PLLA) and hydroxyapatite/poly-l-lactide/collagen (HAp/PLLA/coll) composites were prepared through mechanochemical treatment by planetary ball mill in the air atmosphere. The possible changes that could occur in the composites during preparation were monitored using FTIR (reflection) spectroscopy. In HAp/PLLA composite were noticed all characteristic absorption bands attributed to HAp and PLLA before and after mechanochemical treatment. Also, the same bands were analyzed in HAp/PLLA/coll composite before and after mechanochemical treatment as well as amid I, II, III, A and B bands. This study proved that neither destructive changes in constituents nor formation of new phases occurred during mechanochemical treatment.

P.S.E.17.

**ELECTROPHORETIC DEPOSITION OF CALCIUM-HYDROXYAPATITE ON
TITANIUM SUBSTRATE**

D. Stojanović¹, R. Petrović², I. Janković-Častvan², S. Sajić², V. Mišković-Stanković², Dj.
Janačković², D. Uskoković³

¹Medical Center Vračar, Belgrade, ²Faculty of Technology and Metallurgy, Belgrade, ³Institute
of Technical Sciences of SASA, Belgrade, Serbia and Montenegro

In order to accelerate osseointegration, hydroxyapatite coatings are commonly applied to metallic implants. These coatings can be obtained by various techniques, such as plasma spraying, dip coating, sputter coating, biomimetic coating and electrophoresis. Electrophoretic deposition (EPD) is a colloidal process therein ceramic bodies are shaped directly from a stable colloid dispersion by a dc electric field.

In this paper, the influence of electrophoretic process parameters: type of medium (water or ethanol), temperature, deposition voltage and time of deposition on hydroxyapatite coating morphology, was studied. The stability of colloid dispersions of hydroxyapatite were determined by the sedimentation tests depending on the pH value and surface charge density. Hydroxyapatite powders and coatings were characterized by the SEM, X-ray and FTIR analyses.

P.S.E.18.

ELECTROPHORETIC DEPOSITION OF HYDROXYAPATITE FROM WATER SUSPENSIONS ON STEEL

K. Simović¹, I. Tutunović¹, D. Kičević¹, P. Jovanić²

¹„Vinča“ Institute of Nuclear Sciences, Materials Science Laboratory, Belgrade,

²Institute of Nuclear and Other Mineral Raw Materials, Belgrade, Serbia and Montenegro

Hydroxyapatite as an implant material, can be deposited on different substrates using the electrophoretic deposition, pulsed laser deposition, injection moulding, by calcium and phosphate ion deposition on chemically treated titanium surfaces soaked in aqueous solution, hydrothermal – electrochemical deposition, plasma sprayed and sol gel technique. The aim of this work was to investigate the process of electrophoretic deposition of the hydroxyapatite from water suspensions on steel, as the cathode in the DC current electric field. Since available quantities of hydroxyapatite were limited, alumina powder was used as a model material. Model material was alumina powder, deposited from water suspension in the broad deposition voltage range from 30 – 300 V. The optimum parameters for deposition from water suspensions were the voltage from 30 up to 150 V and the deposition time up to 7 minutes. The applied deposition voltage influences the layer thickness, percentage of surface covered by pores, pore number and average pore diameter, because with the higher applied deposition voltage the hydrogen evolution is much faster. The process of hydrogen diffusion through the deposited layer is influenced by deposition time. The hydroxyapatite suspension was 1M NaCl water suspension adjusted to pH 4.4 with addition of HCl. The powder used was hydroxyapatite powder obtained by wet chemical synthesis in alkali environment with characteristics as followed: crystalline structure, Ca /P ratio 1.67, powder specific area $21 \pm 1 \text{ m}^2\text{g}^{-1}$, spherical particles with average particle size of 10 μm and p.z.c. of 6.1 ± 0.1 . The thickness of layers was determined by weighing the electrode before and after deposition for the hydroxyapatite relative density of 3.156 g cm^{-3} . The percentage of surface covered by pores, pore number and the average pore diameter, as well as the specific surface of pores per cm^{-2} , were detected using the stereo optical microscopy coupled with image analyser. Microstructure properties were determined using the Scanning Electron Microscopy.

P.S.E.19.

PULP REACTION OF DECIDUOUS TEETH ON BIOMATERIALS

D. Marković¹, V. Živojinović¹, V. Koković², V. Jkanović³

¹Clinique for Children and Preventive Stomatology, Faculty of Stomatology, University of Belgrade, ²Military Medical Academy, Belgrade, ³Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro

The aim of this study was to evaluate wound healing and pulp reaction of deciduous teeth on examined materials (hydroxiapatite and calcium hydroxide). Forthly primary molars, equally divided in two groups were included in this study. Following therapy procedure, cavities were restored with glas ionomer cement. Histological analysis was performed after extraction of examined teeth (due to orthodontic reasons or physiological exfoliation) without clinical signs of failure. After hematoxilin eosin and Masson trichrom staining, under the light microscopy, the presence of tunnel defects in dentine bridge was recorded. Criteria for the estimation of dentine bridge quality were based on ISO standards (ISO TR 7405, annex B). Hydroxiapatite showed good results in dentine bridge formation. The structure of dentine bridge in the case of hydroxiapatite, showed that material was incorporated in its formation, being a part of its structure. On the basis of obtained results it can be concluded that hydroxiapatite could be used in pulp therapy of deciduous teeth. There is a need for further clinical research of hydroxiapatite on permanent teeth.

P.S.E.20.

BIOMATERIALS AS ROOT CANAL FILLINGS

D. Marković¹, V. Živojinović¹, V. Koković², V. Jkanović³

¹Clinique for Children and Preventive Stomatology, Faculty of Stomatology, University of Belgrade, ²Military Medical Academy, Belgrade, ³Institute of Technical Sciences of SASA, Belgrade, Serbia and Montenegro

The aim of this study was to evaluate biocompatibility of root canal filling material based on hydroxiapatite. According to the ISO TR-7405 examination of citotoxicity on human diploid lung WI-38 (ATCC Reference Strain CCL75) was performed. Local effects after intramuscular implantation were evaluated according to the ISO 10993-6. Cell morphology was weakly modified after three and five days, while cell density did not show much difference from the negative control. There was no chronic nor allergic reaction, but only moderate acute inflammatory response after one week. From the obtained results it can be concluded that root canal filling material based on hydroxiapatite showed excellent biocompatibility.

Author Index

Adnađević, B.	bora@ffh.bg.ac.yu	52, 53, 73, 120
Aldinger, F.		6
Aleksić, R.	aleksic@elab.tmf.bg.ac.yu	32, 110, 114
Aleksić, O.		89
Alexandrov, I.V.		105
Andelković, K.	kka@chem.bg.ac.yu	117, 118
Antić, V.V.	vantic@chem.bg.ac.yu	22, 79
Antić, M.P.	anticm@sezampro.yu	79
Arandelović, D.		57
Arenz, M.		14
Argiris, Ch.	christos.argiris@tu-clausthal.de	4
Arnold, D.D.		1
Asanović, V.	vanjaa@cg.ac.yu	20
Auroux, A.		86
Babić, B.		10, 47
Babić, D.	milena@vin.bg.ac.yu	95
Babić-Stojić, B.	babic@rt270.vin.bg.ac.yu	107
Baćić, M.		90
Bajrović, N.		92
Bardi, F.		11
Barsoum, M.W.	barsoumw@drexel.edu	35
Bassetti, A.		43, 109
Bates, R.		1
Battiston, G.A.	g.a.battiston@icis.cnr.it	36, 103
Bauer, F.		44
Belošević-Čavor, J.	cjeca@rt270.vin.bg.ac.yu	25, 26
Bengus, V.Z.		105
Berto, D.		36, 103
Bettinelli, M.		104
Bikić, S.	t.mihac@bih.net.ba	92
Biljić, R.		56
Biljić, R.		12
Blagojević, N.		55
Blagojević, N.S.		12, 122
Blečić, D.		55
Blizanac, B.		14
Bobić, I.		18
Bogdanov, Ž.		10, 68
Bojanić, V.	bojanicvaso@yahoo.com	74
Bokorov, M.		106
Bonetti, E.		43, 109
Borchardt, G.		4, 5
Bošković, I.	slavko@ffh.bg.ac.yu	84
Bošković, S.	boskovic@rt270.vin.bg.ac.yu	6, 8, 111, 112

Bošnjak, B.	bosnjakb@server11.cis.cg.ac.yu	70
Božić, D.	dbozic@rt270.vin.bg.ac.yu	9, 114
Brajković, Lj.	brajovic@grf.bg.ac.yu	32
Bučevac, D.	bucevac@vin.bg.ac.yu	111
Budinski-Simendić, J.	jarka@uns.ns.ac.yu	22, 23, 33, 76, 115
Bugarski, B.		50, 75
Bugarski, D.		50
Cabibbo, M.		11
Canton, P.		104
Carta, G.		36
Cekić, B.	cekic@vin.bg.ac.yu	25, 26
Ceulemans, J.	jan.ceulemans@chem.kuleuven.ac.be	37
Chawla, D.		77
Churbaev, R.		37
Cilense, M.		6
Cleri, F.	cleri@casaccia.enea.it	81
Colomban, Ph.		7, 57
Contour, J.-P.		81
Convertino, A.		103
Costa, G.C.C.		6
Cullis, A.G.		1
Cvetković, M.		33
Cvijović, Z.	zocvij@elab.tmf.bg.ac.yu	20, 25, 99
Cvjetičanin, N.	nikcvj@ffh.bg.ac.yu	54, 58, 86
Ćirić-Marjanović, G.	gordana@ffh.bg.ac.yu	23
Ćosović, V.		97
Čajkovski, T.		12, 56
Čajkovski, D.		12
Čančarević, Ž.P.	z.cancarevic@fkf.mpg.de	5
Čančarević, M.	vesnam@vin.bg.ac.yu	17
Čerović, Lj.	buca@vin.bg.ac.yu	53, 103
Čevizović, D.	cevizd@eunet.yu	92
Čomor, M.	mirjanac@rt270.vin.bg.ac.yu	45, 107, 113
Čubrić, B.		75
Damjanović, T.	tanja.damjanovic@tu-clausthal.de	4, 5
Damjanović, Lj.		87, 88
Davidović, L.B.		123
Davidović, M.	davidm@vin.bg.ac.yu	12, 39
Dekanski, A.	dekanski@elab.tmf.bg.ac.yu	34
Delijić, K.	kemal@cg.ac.yu	11, 20
Della Sala, D.		60

Devečerski, A.	drak007@net.yu	111, 114
Dević, S.		71
Dević, S.		82
di Costanzo, T.		15
Dikić, T.		22
Dimčić, B.		20
Dimčić, B.	bidim@rt270.vin.bg.ac.yu	18, 19
Dimitrijević, R.		/
Dimitrijević, R.		85, 88, 89
Dingova, E.	edinga@hipol.com	34
Divjaković, V.		33
Dohčević-Mitrović, Z.	zordoh@phy.bg.ac.yu	108
Dojčilović, J.	jablan@ff.bg.ac.yu	87
Dondur, V.T.	edondur@ffh.bg.ac.yu	45, 85, 86, 87, 88, 89
Doucey, B.		103
Draganić, I.		94
Dragić, M.		74
Dramićanin, M.D.	dramican@ptt.yu	27, 93, 123
Drašković, N.S.		78
Drofenik, M.	miha.drofenik@ijs.si	36, 46
Duc, M.		3
Dugić, M.		49
Dujko, S.		9
Dušek, K.		22
Džunuzović, E.S.		121
Đinović, V.		78
Điporović, M.	iverlab@eunet.yu	34
Đonlagić, J.	jasna@elab.tmf.bg.ac.yu	22, 120
Đorđević, J.	jovana@ffh.bg.ac.yu	87
Đorđević, D.	drdrag64@yahoo.com	119
Đorđević, A.	dvadj@ptt.yu	23, 100
Đuran, M.I.		78
Đurić, S.		69
Đurišić, Ž.		67, 90
Đurović, D.	djd@vin.bg.ac.yu	8
Emiliani, D.		103
Erić, O.	oliverae@rt270.vin.bg.ac.yu	9, 114
Evangelista, E.		11
Fedoroff, M.	Michel.Fedoroff@glvt-cnrs.fr	3
Filipović, J.M.		53, 121
Filipović, N.		117

Fiorini, A.		43, 109
Frappart, C.		15
Gajić-Krstajić, Lj.	gaja@elab.tmf.bg.ac.yu	72, 77, 78
Gajinov, S.		86
Gaković, B.	biljagak@rt270.vin.bg.ac.yu	48, 107
Gal, L.		100
Galović, S.	bobagal@vin.bg.ac.yu	21
Gazdić, I.		92
Gerbasi, R.		36, 103
Gläsel, H.-J.		44
Gnjidić, Ž.		114
Gojković, S.		34
Golubović, A.		96
Gončić, B.		68
Govedarica, M.N.		79
Grabulov, V.	venciaiv@eunet.yu	25
Grbović, J.	dacha@bitsyu.net	43, 109, 111
Grgur, B.		14
Grgur, B.N.		98
Grubišić, S.	grubisic@helix.chem.bg.ac.yu; s_grubisic@yahoo.com	78, 119
Gruden-Pavlović, M.	gmaja@helix.chem.bg.ac.yu	119
Grujić, M.		45
Grujić, S.R.		122
Gubeljak, N.		25
Gundarev, D.V.		105
Hahn, H.		44
Han, K.		110
Harrison, P.	p.harrison@ee.leeds.ac.uk	1, 41
Hegediš, M.		23, 100
Herbig, R.		4
Hercigonja, R.	radah@ffh.bg.ac.yu	89
Hinić, I.		108
Hourlier – Bahloul, Dj.	houplier@unilim.fr	43, 103
Ignjatović, N.	advamat@itn.sanu.ac.yu	24, 51, 120, 124
Ikonić, Z.	ikonic@kiklop.etf.bg.ac.yu	1, 41
Ilavsky, M.		22
Indin, D.	eendi@leeds.ac.uk; d.indjin@ntlworld.com	41
Ishmaku, A.	ishmaku@magnet.fsu.edu	110
Ivanović, N.	nivanov@rt270.vin.bg.ac.yu	25, 26, 28
Ivanović, E.R.		62, 63

Jaćimovski, S.K.		42, 108
Jakovljević, D.		94
Jakšić, J.	nedeljko@elab.tmf.bg.ac.yu	113
Janačković, Đ.	nht@elab.tmf.ac.yu	12, 106, 125
Jančić, R.M.		33
Janković-Častvan, I.	nht@elab.tmf.ac.yu	125
Jansen, M.		5
Jeremić, D.		117
Jeremić, K.		95
Jevtović, V.S.	vule@ih.ns.ac.yu	118
Jokanović, B.	bojan.jokanovic@tu-clausthal.de	5
Jokanović, V.	vukoman@itn.sanu.ac.yu	12, 54, 71, 127
Jordović, B.	jordovic@eunet.yu	40, 64, 65, 69
Jovalekić, Č.	jovalek@ibiss.bg.ac.yu	56
Jovančičević, B.		101
Jovanić, P.		126
Jovanić, B.R.	brana@phy.bg.ac.yu	28, 123
Jovanović, S.M.		74, 94, 96
Jovanović, M.T.	miljov@rt270.vin.bg.ac.yu	17, 18, 19
Jovanović, J.	jelena@itn.sanu.ac.yu	52, 53, 73, 101, 120
Jovanović, T.		101
Jovanović, V.		115
Jovčić, G.		50
Jović, B.	borkaivlada@ptt.yu	72, 77
Jović, V.D.	vladajovic@ibiss.bg.ac.yu	16
Jugović, D.	gaga@itn.sanu.ac.yu	54
Kačarević-Popović, Z.	zkacar@rt270.vin.bg.ac.yu	94, 95
Kalagasidis Krušić, M.T.		121
Kalićanin, B.	bkalicanin@yahoo.com	123
Kaluderović, B.	branka@vin.bg.ac.yu	10
Kapidžić, A.		93
Kapor, A.		23, 100
Karanović, Lj.		59
Karastojković, Z.		67, 90
Karoly, Z.		100
Kelsall, R.W.		1, 41
Khodan, A.	khodan@ipc.rssi.ru	15, 81
Khokhlov, D.R.		91
Kićanović, M.		52, 120
Kićević, D.	kica@rt270.vin.bg.ac.yu	126
Kirilov-Stefanov, P.		59
Koković, V.		127
Koruga, Đ.	koruga@alfa.mas.bg.ac.yu;	11, 24, 49, 99, 101

	korugadj@eunet.yu	
Koruga, I.		101
Košak, A.	aljosa.kosak@ijs.si;	46
	aljosa.kosak@siol.net	
Kostić, R.	romcevi@phy.bg.ac.yu	45
Kostić-Gvozdenović, Lj.		12
Kostoski, D.	kostoski@vin.bg.ac.yu	21
Kostov, A.		91
Koteski, V.	vkotes@vin.bg.ac.yu	26, 28
Kovačević, K.		55
Krakovský, I.	ivank@kmf.troja.mff.cuni.cz	23, 82
Krgović, M.	milun@cg.ac.yu	12
Krsmanović, R.	radenka@unive.it	104
Krstajić, N.	nedeljko@elab.tmf.bg.ac.yu	47, 78, 98, 113
Kulagin, N.	nkulagin@bestnet.kharkov.ua;	29, 87
	kulagin@univer.kharkov.ua	
Kuljanin, J.	kuljanin@vin.bg.ac.yu	113
Kumar, K.A.		44
Kunosić, A.	kunosic@etf.bg.ac.yu;	67, 90
	akunos@yahoo.com	
Labus, N.	labus@ibiss.bg.ac.yu	59
Lačnjevac, Č.	ukilaki@Eunet.yu	72, 77
Lancok, J.		60
Laninović, V.	orionv@yubc.net	51, 95
Laušević, Z.	zoranl@rt270.vin.bg.ac.yu	111
Laušević, M.		90
Lazar, D.		23, 100
Lazić, V.	AMBIPAK@uns.ns.ac.yu	33
Lazić, N.L.	okovacevic@iofh.bg.ac.yu	76
Lazić, M.	m.tosic@itnms.ac.yu	85, 106
Lefevre, G.		3
Leipner, H.		4
Leka, Z.	zorica@cg.ac.yu	20, 79
Leovac, V.M.	vule@ih.ns.ac.yu	118
Liew, S.L.		1
Likar-Smiljanić, V.	okidoki@etf.bg.ac.yu	12, 56
Logar, M.		71
Lončar, B.		24
Loreti, S.	loreti@frascati.enea.it	60
Lović, J.D.		48
Lukić, S.R.	svetdrag@im.ns.ac.yu	30, 79
Lukić, P.	plukic@mas.bg.ac.yu	42
Lukshina, V.		38
Lynch, S.A.		1

Macura, S.		87, 88
Mahnke, H.-E.		28
Majstorović, J.		33
Makabe, T.		2, 38
Makovec, D.		36, 46
Maksimović, V.M.	vesnam@vin.bg.ac.yu	17, 20, 63
Malović, G.	malovic@phy.bg.ac.yu	9
Manasijević, M.	manasije@vin.bg.ac.yu	25, 26
Manasijević, D.		91
Mančić, L.	lydia@itn.sanu.ac.yu	83
Manojlović, D.		56
Maravić, D.		124
Maričić, A.	marec@tfc.kg.ac.yu	40, 64, 65, 66, 67
Marinković, Z.	mzorica@mi.sanu.ac.yu; mzorica@afrodita.rcub.bg.ac.yu	58, 59, 69, 83
Marinović-Cincović, M.	milena@vin.bg.ac.yu	12, 95, 115
Marjanović, D.		26
Markov, S.		118
Marković, D.		127
Marković, D.S.		31
Marković, N.M.	nmmarkovic@lbl.gov	14
Marković, S.	smarkovic@itn.sanu.ac.yu	58, 85, 89
Marković, G.	dopetrov@tigar.com	115
Marković, Z.		100
Matija, L.	korugadj@eunet.yu	24, 49, 99
Matović, B.	matovic@aldix.mpi-stuttgart.mpg.de	6
Matsui, J.		38
Mazzone, G.		81
Mehnert, R.		44
Menicucci, I.		60
Mentus, S.	slavko@ffh.bg.ac.yu	23, 54, 61, 84, 86
Messina, M.		81
Michel, D.		15, 81
Mihač, T.	t.mihac@bih.net.ba	92
Mihajlović, S.		11
Mikičić, D.		67, 90
Milanović, V.		41
Milenković, S.		53
Miletić, P.		74
Miličević, D.	dejanmilicevic@vin.bg.ac.yu	21
Milivojević, D.	dusanm@rt270.vin.bg.ac.yu	107
Miljković, M.		116
Miljković, J.		34
Miljković, M.	mmiki@medfak.ni.ac.yu	51, 54, 58, 88

Milonjić, S.	smiloni@vin.bg.ac.yu	3, 34, 45, 96, 103
Milošević, O.	oly@itn.sanu.ac.yu	83
Milovanović, V.		65, 66
Milutinović, A.	miluta@phy.bg.ac.yu	29, 82
Minarini, C.		60
Minić, D.	dminic@ffh.bg.ac.yu	67, 118
Mioč, U.B.	ubavka@ffh.bg.ac.yu	12, 57
Mirčetić, A.	msandra@telekom.yu; aleksandram@telekom.yu	41
Mišković, Z.		18
Mišković, Z.	mzoran@imk.grf.bg.ac.yu	32
Mišković-Stanković, V.	vesna@elab.tmf.bg.ac.yu	34, 106, 125
Mitkov, M.	mitkov@vin.bg.ac.yu	9
Mitrić, M.	mmitric@vin.bg.ac.yu	54, 58
Mitrović, N.	nmitrov@tfc.kg.ac.yu	40
Mohai, I.		100
Mojović, Z.	slavko@ffh.bg.ac.yu	86
Montone, A.	montone@casaccia.enea.it	43, 109
Mujičić, V.	milun@cis.cg.ac.yu	12
Murzyn, P.		1
Myroshnychenko, V.		82
Nadolny, A.J.		29
Nastasović, A.	anastaso@helix.chem.bg.ac.yu	51, 94, 96
Natić, M.	mmandic@chem.bg.ac.yu; majan@net.yu	117
Natsik, V.D.		105
Nedeljković, D.		114
Nedeljković, J.M.		45, 113
Nedić, Z.P.	snezaum@pharmacy.bg.ac.yu	57
Nenadović, T.	tomnenad@vin.bg.ac.yu	48, 107
Nešković, C.		3
Nikčević, I.	irena@vin.bg.ac.yu	124
Niketić, S.R.	nik@chem.bg.ac.yu	119
Nikiforov, V.N.		29, 93
Nikitović, Ž.	zeljka@phy.bg.ac.yu	9
Nikolić, M.S.	nima@elab.tmf.bg.ac.yu	120
Nikolić, Lj.	srdicvv@uns.ns.ac.yu	106
Nikolić, A.		11
Nikolić, A.		68, 102
Nikolić, A.S.	asn@chem.bg.ac.yu	56, 97
Nikolić, B.	bane@elab.tmf.bg.ac.yu	34
Nikolić, G.M.		123
Nikolić, I.	irena@cg.ac.yu	55
Nikolić, J.D.		122

Nikolić, M.-V.	maria@mi.sanu.ac.yu	83
Nikolić, R.S.	ruzica@yahoo.com	123
Nikolić, Z.M.	nizoran@eunet.yu	84
Nikolić, S.		96
Nikorich, A.V.		91
Norris, D.J.		1
Noskova, N.	noskova@imp.uran.ru	37, 38
Novaković, N.	novnik@rt270.vin.bg.ac.yu	25, 26
Novaković, M.		119
Novitović, O.	asn@chem.bg.ac.yu	97
Obradović, N.	ninao@bib.sanu.ac.yu	59
Obradović, B.	bojana@elab.tmf.bg.ac.yu	50
Obradović, M.D.	majao@elab.tmf.bg.ac.yu	98
Odović, M.		57
Onjia, A.E.	onjia@vin.bg.ac.yu	51, 90, 94, 96, 102
Osmokrović, P.		24, 56
Ostojić, S.		52
Pajić-Lijaković, I.		75
Panić, V.	panic@elab.tmf.bg.ac.yu	34
Pasquini, L.		43, 109
Paul, D.J.		1
Paunović, N.		124
Paunović, V.	vesna@elfak.ni.ac.yu	88
Pavlović, Lj.J.		62, 63
Pavlović, Lj.M.	m.tosic@itnms.ac.yu	85, 106
Pavlović, M.B.		56
Pavlović, M.G.	duki@elab.tmf.bg.ac.yu	62, 63, 74
Pavlović, V.B.		84
Pejović, V.		8, 58
Pepić, D.	dpepich@yahoo.com	120
Perreux, D.		110
Peruško, D.	dperusko@vin.bg.ac.yu	68
Pešikan-Sekulić, D.R.	pesikan@vin.bg.ac.yu	31
Petakov, M.		50
Petranović, N.		111
Petrov, Lj.		11
Petrović, D.D.		30
Petrović, D.	gaca@uns.ns.ac.yu	23, 100
Petrović, D.M.		30
Petrović, R.	radaab@elab.tmf.bg.ac.yu	106, 125
Petrović, S.	spetro@rt270.vin.bg.ac.yu	48, 107
Petrović, S.	zcupic@nanosys.ihtm.bg.ac.yu	59
Petrović, T.		72

Petrović, V.	verapetrovic@vets.edu.yu	8
Petrović, V.B.		30
Petrović, Z.		33
Petrović, Z.Lj.	zoran@phy.bg.ac.yu	2, 9, 38
Pidgeon, C.R.		1
Pješčić, M.		84
Plavšić, M.B.	plavsic@elab.tmf.bg.ac.yu	49, 75, 76, 124
Plavšić, M.M.		124
Polizzi, S.	polizzi@unive.it	104
Popov, K.	kosta@elab.tmf.bg.ac.yu	62, 63
Popović, D.	jablan@ff.bg.ac.yu	87
Popović, I.	igpop@yubc.net	53, 73
Popović, K.Đ.	ksenija@elab.tmf.bg.ac.yu	48
Popović, N.	nada@rt270.vin.bg.ac.yu	10, 68
Popović, N.		101
Popović, Z.V.		82
Popović, R.S.		75
Potapov, A.		38
Purenović, M.		116
Putanov, P.		124
Putić, S.	slavisa@elab.tmf.bg.ac.yu	32
Puzović, J.M.		56
Radanović, D.D.		78
Radenković, G.	rgoran@masfak.ni.ac.yu	20
Radičević, R.Ž.	radapoli@uns.ns.ac.yu	33, 76
Radisavljević, I.	iva@rt270.vin.bg.ac.yu	26
Radmilović, V.	vrradmilovic@lbl.gov	17, 55
Radmilović-Radenović, M.		9
Radojčić, B.	bradojcic@yahoo.com	89
Radojević, V.	vesnar@elab.tmf.bg.ac.yu	96, 114
Radonjić, B.		69
Radovanović, J.	radovanovic@kiklop.etf.bg.ac.yu; radovanovic@phy.bg.ac.yu	41
Radovanović, B.		115
Radulović, B.		70
Radulović, V.	mmandic@chem.bg.ac.yu	118
Rafailović, L.	lydiar@Eunet.yu	64, 66
Rajković, V.	visnja@rt270.vin.bg.ac.yu	9, 114
Rakić, V.	vraic@ffh.bg.ac.yu	86, 89
Rakin, M.	marko@elab.tmf.bg.ac.yu; mrakin@eunet.yu	25, 99
Rakočević, Z.	zlatkora@vin.bg.ac.yu	107
Raković, D.	info@iasc-bg.org.yu; rakovic@net.yu	49
Ramović, R.	ramovic@kiklop.etf.bg.ac.yu	42, 89, 92

Raspopović, Z.		9
Ratkaj, Z.		49
Rebernik, M.		97
Ribić-Zelenović, L.		67
Ristić, M.M.	risticm@mi.sanu.ac.yu	8, 59, 83, 84
Ristovski, Z.		27
Rixecker, G.		6
Robbins, D.J.		1
Robinet, P.		110
Romčević, M.	romcevi@vin.bg.ac.yu	24, 29, 45, 91, 93
Romčević, N.	romcevi@phy.bg.ac.yu	24, 29, 45, 91, 93, 124
Romhanji, E.	endre@elab.tmf.bg.ac.yu	9
Ross, P.		14
Sabo, T.J.	tsabo@chem.bg.ac.yu	56, 79
Sajfert, V.D.		42, 108
Sajić, S.		
Sakadžić, S.		38
Samardžija-Jovanović, S.	dopetrov@tigar.com	115
Santoni, A.		60
Schöen, J.-Ch.		5
Sedmak, A.	aleksandar_sedmak@mntr.sr.gov.yu; sedmaka@eunet.yu	25
Shimada, T.		2
Shulika, V.		38
Simeunović, J.		118
Simeunović, R.		40, 65
Simić-Krstić, J.		99, 101
Simić, M.		32
Simões, A.Z.		6
Simović, K.	ksimovic@yubc.net	126
Skerović, V.		68, 102
Skuban, S.J.		79
Sladić, D.		117
Smičiklas, I.D.	ivanat@vin.bg.ac.yu	102
Soref, R.A.		1
Spasojević, N.		38
Spasojević, M.	stanasko@tfc.kg.ac.yu	64, 66, 67
Spasović, S.		87
Speghini, A.		104
Spigarelli, S.		11
Srdić, V.V.	srdivv@uns.ns.ac.yu	44, 106
Srečković, M.		10
Srečković, T.V.	tatjanas@afrodita.rcub.bg.ac.yu	58, 59

Sredić, S.		12
Stajić-Trošić, J.	cmm@elab.tmf.bg.ac.yu	97
Stamboliev, G.		21
Stamenković, V.		14
Stanišić, G.		108
Stanković, S.		24
Stanković, S.	slavka@elab.tmf.bg.ac.yu; stslavka@eunet.yu	94, 98
Stevanović, M.M.	stem@sezampro.yu; stem@vin.bg.ac.yu	31
Stojanović, M.S.		56
Stojanović, D.	romcevi@phy.bg.ac.yu	91
Stojanović, B.D.	biljana@ibiss.bg.ac.yu	6
Stojanović, S.	sandra@mpgag.uni-leipzig.de	44
Stojanović, N.		50
Stojanović, D.		125
Strinić, A.		9
Sulejmanović, S.	suadas2002@yahoo.com	92
Suljovrujić, E.	esuljovrujic@chem.ucsb.edu; sedin@ptt.yu	21
Szepvolgyi, J.		100
Šašić, R.		92
Šašić, O.		9
Šćepanović, M.		108
Šetrajčić, J.P.	bora@im.ns.ac.yu	42, 108
Šiljegović, M.		94
Šljukić, B.	nikolav@ffh.bg.ac.yu	61
Štrbac, S.		48
Tabachnikova, E.D.	tabachnikova@ilt.kharkov.ua	105
Tadić, S.	miljov@rt270.vin.bg.ac.yu	18, 19
Tais, M.		92
Taliashvili, B.		29
Talijan, N.		97, 114
Terlecki-Baričević, A.	aterlecki@nanosys.ihtm.bg.ac.yu	59
Tešić, Ž.		79, 86, 117
Thiebaud, F.		110
Tjapkin, N.		94
Todorović, Ž.N.	zaklina@vin.bg.ac.yu	45
Todorović, M.R.		57
Todorović-Marković, B.	biljatod@vin.bg.ac.yu	100
Tomandl, G.		4
Tomić, S.	simonida@elab.tmf.bg.ac.yu	121
Tomić, A.		49

Tomić, N.		82
Tomić, P.		39
Topić, Z.		74
Tošić, M.B.	m.tosic@itnms.ac.yu	122
Tošić, B.S.		42, 108
Trajić, J.	romcevi@phy.bg.ac.yu	29, 93
Trajković, D.		119
Trifunović, S.R.		79
Tripković, A.	amaliija@elab.tmf.bg.ac.yu	48
Trišović, T.	trisa@elab.tmf.bg.ac.yu	78
Trtica, M.		10, 48
Tutunović, I.		126
Uskoković, P.	puskok@yubc.net	32, 110
Uskoković, V.	vuk.uskokovic@ijs.si	46
Uskoković, D.	uskok@itn.sanu.ac.yu	24, 51, 52, 54, 58, 120, 124, 125
Uskoković-Marković, S.	snezaum@pharmacy.bg.ac.yu	57
Valčić, A.		96
Valiev, R.Z.		105
Van Khoi, L.	lkhoi@ifpan.edu.pl	13
Varela, J.A.		6
Vasić, A.	avasic@mas.bg.ac.yu	24
Vasil'ev, A.N.		93
Vasiljević, T.	tanjadj@eunet.yu; tanjav@elab.tmf.bg.ac.yu	90
Veličković, S.J.		73
Verlinden, B.		70
Viana, B.		28
Vignes, J.-L.		15
Vildanova, N.		37
Viticoli, S.		103
Vittori Antisari, M.		43, 109
Vodnik, V.V.		45
Vojinović-Miloradov, M.		23, 100
Vojnović, M.		98
Volkov-Husović, T.	tatjana@elab.tmf.bg.ac.yu	33
Vračar, Lj.	ljvracar@elab.tmf.bg.ac.yu	88, 98, 113
Vratnica, M.	majav@cg.ac.yu	99
Vučković, A.	acavuc@rt270.vin.bg.ac.yu	112
Vukadin, P.		68
Vukčević, M.	maggie@cg.yu	11
Vukelić, N.	nikolav@ffh.bg.ac.yu	61
Vukotić, V.M.	mini@ibiss.bg.ac.yu	58

Vulić, P.		83
Vunjak-Novaković, G.		50
Weiß, R.		4, 5
Winterer, M.		44
Yagisawa, T.		2
Zarubica, V.	velkozarubica1@yahoo.com	68, 102
Zarubica, A.	zarubica2000@yahoo.com	116
Zdujić, M.	zdujic@itn.sanu.ac.yu	59
Zec, S.P.		10, 17, 18, 45, 68
Zlatanović, M.	ezlatano@etf.bg.ac.yu	10, 67, 68, 90
Zlatanović, D.	paster@bankerinter.net	80
Zlatičanin, B.	biljana@cg.ac.yu	69
Živanović, D.	d.zivanovic@itnms.ac.yu	60
Živanović, V.	m.tosic@itnms.ac.yu	122
Živković, Lj.		88
Živković, D.	dzivkovic@tf.bor.ac.yu; dzmaca@ptt.yu	91
Živković, I.	bziv@eunet.yu	32
Živojinović, V.		127