TENTH YOUNG RESEARCHERS' CONFERENCE
MATERIALS SCIENCE AND ENGINEERING

December 21–23, 2011, Belgrade, Serbia
Serbian Academy of Sciences and Arts, Knez Mihailova 35 & 36

PROGRAM AND THE BOOK OF ABSTRACTS

Materials Research Society of Serbia

Institute of Technical Sciences of SASA

December 2011, Belgrade, Serbia

Tenth Young Researchers' Conference
Materials Science and Engineering

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Program and the Book of Abstracts

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Aim of the Conference

Main aim of the conference is to enable young researchers (post-graduate, master or doctoral student, or a PhD holder younger than 35) working in the field of materials science and engineering, to meet their colleagues and exchange experiences about their research.

Topics

Nanostructured materials

New synthesis and processing methods
Materials for high-technology applications
Biomaterials

Scientific and Organizing Committee

Results of the Conference

Beside printed «Program and the Book of Abstracts», which is disseminated to all conference participants, selected and awarded peer-reviewed papers will be published in the journals Tehnika – Novi Materijali and Chemical Industry. The best presented papers, suggested by Session Chairpersons and selected by Awards Committee, will be proclaimed at the Closing Ceremony.

Acknowledgement

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Programme
Tenth Young Researchers Conference
Materials Science and Engineering

Wednesday, December 21, 2011
Hall 2, 1st floor, SASA, Knez Mihailova 35

08.30 Registration

09.30 – 10.00 Opening Ceremony of the Tenth Young Researchers Conference – Materials Science and Engineering
Prof. Dr. Nenad Ignjatović, President of the Organizing and Programming Committee
Prof. Dr. Dragan Uskoković, President of the Materials Research Society of Serbia

10.00 – 12.45 1st Session – Synthesis of Biomaterials
Chairpersons: Dr. Magdalena Stevanović and Miodrag Lukić

10.00 – 10.15 Design, synthesis and evaluation of non-urea inhibitors of soluble epoxide hydrolase
Stevan Pecic[1], Shi-Xian Deng[1], Christophe Morisseau[2], Bruce D. Hammock[2], Donald W. Landry[1]
[1]Department of Medicine, Columbia University, New York, NY, USA, [2]Department of Entomology and UCD Cancer Center, University of California, Davis, CA, USA

10.15 – 10.30 Synthesis, characterization and sintering properties of Zr-doped hydroxyapatite
Miodrag J. Lukić[1], Srečo D. Škapin[2], Smilja Marković[1], Dragan Uskoković[1]
[1]Center for Fine Particles Processing and Nanotechnologies, Institute of Technical Sciences of SASA, Belgrade, Serbia, [2]Advanced Materials Department, Jožef Stefan Institute, Ljubljana, Slovenia

10.30 – 10.45 One – pot synthesis of hydrophobic hydroxyapatite nano particles
Zoran Stojanović, Miodrag Lukić, Dragan Uskoković
Institute of Technical Sciences of SASA, Belgrade, Serbia

10.45 – 11.00 Synthesis and the effect of processing parameters on characteristics of poly-ε-caprolactone micro- and nanospheres
Nenad Filipović[1], Magdalena Stevanović[1], Vladimir Pavlović[1,2], Aleksandra Radulović[3], Zoran Stojanović[1], Dragan Uskoković[1]
[1]Institute of Technical Sciences of SASA, Belgrade, Serbia, [2]Faculty of Agriculture, University of Belgrade, Belgrade, Serbia, [3]Institute of General and Physical Chemistry, Belgrade, Serbia

11.00 – 11.30 Break

11.30 – 11.45 Multilayered core-shell nanoparticle model for biomaterials delivering
Stevan Armaković[1], Ana J. Šetrajčić-Tomić[2], Igor J. Šetrajčić[1]
[1]University of Novi Sad, Faculty of Sciences, Department of Physics, Vojvodina – Serbia, [2]University of Novi Sad, Medical Faculty, Department of Pharmacy, Vojvodina – Serbia

11.45 – 12.00 Controlled release of aspirin from surfactant-modified natural zeolite
Sanja Jevtić[1], Svetlana Grujić[1], Gregor Mali[2], Nevenka Rajić[1]
[1]University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia, [2]National Institute of Chemistry, Ljubljana, Slovenia

12.00 – 12.15 Investigation on the potential application of thermosensitive hydrogels for controlled release of phenacetin
Snežana Ilić-Stojanović[1], Ljubiša Nikolić[1], Vesna Nikolić[1], Mihajlo Stanković[1], Slobodan Petrović[2], Jela Milić[3]
[1]University of Niš, Faculty of Technology, Leskovac, Serbia, [2]University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia, [3]University of Belgrade, Faculty of Pharmacy, Belgrade, Serbia

12.15 – 12.30 Production and characterization of hydrogel nanocomposites based on alginate and poly(vinyl alcohol) with incorporated silver nanoparticles
Milena Nemet, Jasmina Stojkovska, Željka Jovanović, Vesna Mišković-Stanković, Bojana Obradović
Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

12.30 – 12.45 Comparison of corrosion resistance between composite silver/hydroxyapatite/lignin (Ag/HAP/Lig) and hydroxyapatite/lignin (HAP/Lig) coatings in simulated body fluid
Sanja Eraković[1], Rade Surudžić[1], Djordje Veljović[1], Tatjana Stevanović[2], Djordje Janaćković[1], Vesna Mišković-Stanković[1]
[1]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia, [2]Département des sciences du bois et de la forêt, Université Laval, Québec, Canada

12.45 – 14.15 Lunch break with refreshments

14.15 – 17.00 2nd Session – Application of Biomaterials

Chairpersons: Prof. Dr. Bojana Obradović and Nenad Petrović

14.15 – 14.30 Assessment of the effects of nanoparticles of CP/PLGA on cultures of different cell lines
Stevo Najman[1], Sanja Stojanović[1], Jelena Najdanović[1], Nenad Ignjatović[2], Dragan Uskoković[2]
[1]University of Niš, Faculty of Medicine, Institute of Biology and Human Genetics, Serbia, [2]Institute of Technical Sciences of SASA, Belgrade, Serbia

14.30 – 14.45 Antibacterial activity of the copper-loaded zeolite
Jelena Milenković[1], Jasna Hrenović[2], Nevenka Rajić[3]
[1]*Innovation Centre of the Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia,* [2]*University of Zagreb, Faculty of Science, Division of Biology, Zagreb, Croatia,* [3]*University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia*

14.45 – 15.00 Morphology controlled hydrothermal synthesis of ZnO particles and examination of their antibacterial properties on *Escherichia coli* and *Staphylococus aureus* bacterial cultures
Ana Stanković[1], Ljiljana Veselinović[1], Smilja Marković[1], Suzana Dimitrijević[2], Srečo D. Škapin[3], Dragan Uskoković[1]
[1]*Institute of Technical Sciences of SASA, Belgrade, Serbia,* [2]*Faculty of Technology and Metallurgy, University of Belgrade, Serbia,* [3]*Jožef Štefan Institute, Ljubljana, Slovenia*

15.00 – 15.15 Fullerenol $C_{60}(OH)_{24}$ decrease DNA damages on human lymphocytes
Jasminka Mrdjanović[1], Slavica Šolajić[1], Višnja Bogdanović[1], Aleksandar Djordjević[2], Gordana Bogdanović[1], Rade Injac[3], Zlatko Rakočević[4]
[1]*Oncology Institute of Vojvodina, Experimental Oncology Department, Sremska Kamenica, Serbia,* [2]*University of Novi Sad, Faculty of Science, Department of Chemistry, Novi Sad, Serbia,* [3]*Faculty of Pharmacy, University of Ljubljana, Ljubljana, Slovenia,* [4]*Institute "Vinča" of Nuclear Sciences, Belgrade, Serbia*

15.15 – 15.30 The rabbit gingival tissue response to retraction liquids and tetrahydrozoline
Ivan Kostić[1], Dragan Mihailović[2], Stevo Najman[1], Sanja Stojanović[1], Milena Kostić[3]
[1]*University of Niš, Faculty of Medicine, Institute of Biology and Human Genetics, Serbia,* [2]*University of Niš, Faculty of Medicine, Institute of Pathology, Serbia,* [3]*Clinic of Dentistry Niš, Department of Prosthodontics, Serbia*

15.30 – 15.45 Joint effects of vitamin D and nanobiomaterial in the jaw bone regeneration
Zorica Ajduković[1], Nenad Ignjatović[2], Nenad Petrović[1], Vojin Savić[3], Dragan Mihailović[4], Dragan Uskoković[2]
[1]*University of Niš, Faculty of Medicine, Clinic of Stomatology, Department of Prosthodontics, Serbia,* [2]*Institute of Technical Sciences of SASA, Belgrade, Serbia,* [3]*University of Niš, Faculty of Medicine, Institute of Biomedical Research, Serbia,* [4]*University of Niš, Faculty of Medicine, Institute of Pathology, Serbia*

15.45 – 16.00 Break

16.00 – 16.15 Applicability of neural networks in the estimation of brain iron content in the diagnosis of amyotrophic lateral sclerosis
Miloš Milović[1], Miloš Mojović[2], Aleksandar Ignjatović[2]
[1]*Institute of Technical Sciences of SASA, Belgrade, Serbia,* [2]*Faculty of Physical Chemistry, Belgrade University, Belgrade, Serbia*

16.15 – 16.30 Silver/alginate nanocomposites: Biomedical potential of silver/alginate microbeads
Željka Jovanović[1], Jasmina Stojkovska[1], Maja Vukašinović-Sekulić[1], Ivana Matić[2], Zorica Juranić[2], Bojana Obradović[1], Vesna Mišković-Stanković[1]
[1]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia, [2]Institute of Oncology and Radiology of Serbia, University of Belgrade, Belgrade, Serbia

16.30 – 16.45 Influence of anion type on the structure of pectin gels crosslinked with copper
Sanja Šešlija[1], Jasmina Stevanović[2], Tatjana Volkov-Husović[1], Sava Veličković[1]
[1]Faculty of Technology and Metallurgy, University of Belgrade , Belgrade, Serbia, [2]Institute of Chemistry, Technology and Metallurgy, Department of Electrochemistry, Belgrade, Serbia

16.45 – 17.00 Effect of water immersion on the tensile bond strengths of four soft reliners to a denture base resin
Dušan Petković[1], Milena Kostić[2], Dimitrije Petrović[2], Nebojša Krunić[2], Goran Radenković[1]
[1]Faculty of Mechanical Engineering University of Niš, Niš, Serbia, [2]Clinic of Dentistry, Department of Prosthodontics, Niš, Serbia

17.00 – 17.15 Break

17.15 – 18.15 3rd Session – Mechanochemistry of Materials

Chairpersons: Dr. Smilja Marković and Suzana Filipović

17.15 – 17.30 Mechanochemical synthesis of the copper-doped calcium titanate
Piotr Dulian[1], Krystyna Wieczorek-Ciurowa[1], Wojciech Bąk[2], Czesław Kajtoch[2]
[1]Faculty of Chemical Engineering and Technology, Cracow University of Technology, Cracow, Poland, [2]Faculty of Physics, Pedagogical University, Cracow, Poland

17.30 – 17.45 Sintering of mechanically activated MgO-TiO_2 system
Suzana Filipović[1], Nina Obradović[1], Darko Kosanović[1], Vladimir Pavlović[1], Antonije Djordjević[2]
[1]Institute of Technical Science of SASA, Belgrade, Serbia, [2]School of Electrical Engineering, University of Belgrade, Belgrade, Serbia

17.45 – 18.00 Mechanochemical synthesis $Ba_{0.8}Sr_{0.2}TiO_3$
Darko Kosanović[1], Suzana Filipović[1], Miodrag Mitrić[2], Smilja Marković[1], Nina Obradović[1], Aleksa Maričić[3], Vladimir Pavlović[1], Jelena Živojinović[1], Momčilo M. Ristić[4], Milan Dukić[5]
[1]Institute of Technical Sciences of SASA, Belgrade, Serbia, [2]The Vinča Institute of Nuclear Sciences, Condensed Matter Physics Laboratory, Belgrade, Serbia, [3]Technical Faculty Čačak, Čačak, Serbia, [4]Serbian Academy of Sciences and Arts, Belgrade, Serbia, [5]North Carolina Central University Durham, USA

18.00 – 18.15 Mechanomaking of boron crystal solid solution in fcc Fe-Ni alloys
A. Litvinov, Kirill Lyashkov, V. Shabashov, N. Kataeva
Institute of Metal Physics UB RAS, Yekaterinburg, Russia

Thursday, December 22, 2011
Hall 2, 1st floor, Knez Mihailova 36

09.00 – 10.45 4th Session – Theoretical Modelling of Materials

Chairpersons: Dr. Nenad Ivanović, Dr. Željka Nikitović and Gokaran Nath Shukla

09.00 – 09.15 Thermal modelling of organic light emitting diode
Gokaran Nath Shukla
Indian Institute of Technology, Kanpur, India

09.15 – 09.30 Spin ordering in quasi-one-dimensional systems
Nataša Lazić, Milan Damnjanović
NanoLab, Faculty of Physics, University of Belgrade, Belgrade, Serbia

09.30 –09.45 Carbon nanocoils: structure and stability
Zoran P. Popović, Milan Damnjanović, Ivanka Milošević
NanoLab, Faculty of Physics, University of Belgrade, Serbia

09.45 – 10.00 Ab initio study of electronic structure and hyperfine interaction parameters in HfV2 and ZrV2 laves phases
Jana Radaković
Laboratory of Nuclear and Plasma Physics, Institute of Nuclear Sciences "Vinča", Belgrade, Serbia

10.00 – 10.15 DFT investigation of intermetallic compounds for hydrogen storage applications
Katarina Ćirić, Vasil Koteski
Laboratory for Nuclear and Plasma Physics, "Vinča" Institute of Nuclear Sciences, Belgrade, Serbia

10.15 – 10.30 New variant of the model of the Bray-Liebhafsky analytical matrix
Ana D. Stanojević[1], Željko D. Čupić[2], Slobodan R. Anić[2]
[1]Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia, [2]Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Department of Catalysis and Chemical Engineering, Belgrade, Serbia

10.30 – 10.45 Bray-Liebhafsky oscillatory reaction as the matrix for testing the catalysts: Optimizations of conditions when reaction is performed in open reactor
Branislav S. Stanković[1], Željko D. Čupić[2], Ljiljana Z. Kolar-Anić[1]
[1]Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia, [2]Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Department of Catalysis and Chemical Engineering, Belgrade, Serbia

10.45 - 11.15 Break

11.15 – 13.00 5th Session – Corrosion and Metallurgy of Materials

Chairpersons: Dr. Nebojša Nikolić, Dr. Jasmina Grbović Novaković and Željka Jovanović

11.15 – 11.30 Evaluation of TOFA/DETA imidazoline as corrosion inhibitor for top of the line corrosion (TLC) of mild steel in CO_2 environment
Ivana Jevremović[1], Marc Singer[2], Mohsen Achour[3], David Blumer[3], Thomas Baugh[3], Vesna Mišković-Stanković[1], Srdjan Nešić[2]
[1]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia, [2]Ohio University - Institute for Corrosion and Multiphase Technology, Athens, Ohio, USA, [3]ConocoPhillips Company, Bartlesville, OK, USA

11.30 – 11.45 Surface analysis and corrosion stability of vinyltriethoxysilane films on aluminium in mild sodium chloride solution
Željka Jovanović[1], Ingrid Milošev[2], Jelena Bajat[1], Vesna Mišković-Stanković[1]
[1]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia, [2]Jožef Stefan Institute, Department of Physical and Organic Chemistry, Ljubljana, Slovenia

11.45 – 12.00 Electrodeposition of Zn-Mn alloys with high Mn percentage from chloride electrolyte
Mihael Bučko, J. B. Bajat, B. Jokić
Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

12.00 – 12.15 Research on local corrosion processes in low-alloyed pipeline steel
S. Belikov, Ksenia Sergeeva
The Ural Federal University named after First President of Russia B.N. Yeltsin, Ekaterinburg, Russia

12.15 – 12.30 ADI - an advanced engineering material
Milica Damjanović[1], Dragan Rajnović[1], Olivera Erić[2], Sebastian Baloć[1], Leposava Sidjanin[1]
[1]Faculty of Technical Science, University of Novi Sad, Novi Sad, [2]Institute Kirilo Savić, Belgrade

12.30 – 12.45 Mössbauer analysis of the cold plastic deformation rate effect on intermetallics dissolution in Fe-Ni alloys
V. Shabashov, V. Sagaradze, Kirill Kozlov, A. Litvinov
Institute of Metal Physics UB RAS, Yekaterinburg, Russia

12.45 – 13.00 Utilization of Pb– metallurgical waste
Lucia Kovalova, Josip Isek, Lukas Koval, Tien Pham Duc, Peter Fecko
Institute of Environmental Engineering, VSB-TU Ostrava, Ostrava-Poruba, Czech Republic

13.00 – 15.00 Lunch break with refreshments

15.00 – 16.15 6th Session – Electrochemical and Analytical Chemistry of Materials

Chairpersons: Dr. Nebojša Nikolić, Dr. Jasmina Grbović Novaković and Ludmila Šimková

15.00 – 15.15 Determination of glucose using polyaniline modified electrode
Daliborka Jambrec[1], Milica Gvozdenović[2], Branimir Jugović[3]
[1]Innovation Center, Faculty of Technology &Metallurgy, University of Belgrade, Belgrade, Serbia, [2]Faculty of Technology &Metallurgy, University of Belgrade, Belgrade, Serbia, [3]Institute of Technical Sciences of SASA, Belgrade, Serbia

15.15 – 15.30 Oxygen reduction on polycrystalline Au modified by nanosized Pd islands
Milutin Smiljanić[1], I. Srejić[1], Zlatko Rakočević[1], S. Štrbac[2]
[1]Institute of Nuclear Sciences Vinča, Laboratory of Atomic Physics, Belgrade, Serbia, [2]ICTM-Institute of Electrochemistry, University of Belgrade, Belgrade, Serbia

15.30 – 15.45 Electrochemistry and spectroscopy of an energetic material FOX-7 – A molecular approach to degradation mechanism
Ludmila Šimková[1], Evgenia Dmitrieva[2], Jiří Klíma[1], Lothar Dunsch[2], Jiří Ludvík[1]
[1]Department of Molecular Electrochemistry, J. Heyrovský Institution of Physical chemistry Academy of Sciences, Prague, Czech Republic, [2]Department of Electrochemistry and Conducting Polymers, Leibniz Institute for Solid State and Materials Research Dresden, Dresden, Germany

15.45 – 16.00 Adsorptive stripping voltammetric determination of trace levels of doxorubicin in selected real samples
Danica Jović, Valéria Guzsvány, Aleksandar Djordjević, Zsigmond Papp, Ivana Ičević
University of Novi Sad, Faculty of Science, Department of Chemistry, Biochemistry and Environmental Protection, Novi Sad, Serbia

16.00 – 16.15 Oxidation of hydroxide ions at platinum modified zeolite electrode
Tihana M. Mudrinić, Zorica D. Mojović, Andjela S. Abu Rabi-Stanković, Ana Z. Ivanović, Aleksandra D. Milutinović-Nikolić, Dušan M. Jovanović
University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Department of Catalysis and Chemical Engineering, Belgrade, Serbia

16.15 – 16.30 Break

16.30 – 18.45 7th Session – Nanomaterials

Chairpersons: Dr. Dragana Jugović and Natalia Shurpo

16.30 – 16.45 Preparation of Si-Ge nanostructured thermoelectic materials by mechanical alloying
Andrey Usenko, A. Voronin, M. Gorshenkov, V. Khovaylo, S. Kaloshkin
National University of Science and Technology "MISiS", Moscow, Russia

16.45 – 17.00 Developing of cobalt and corundum nanopowders for bond application at diamond tool manufacturing
Evgeny A. Kolesnikov, Vera V. Levina, Nikolay I. Polushin, Denis V. Kuznetsov
National University of Science and Technology "MISIS", Moscow, Russia

17.00 – 17.15 A method for obtaining nanosized molybdenum powders from petrochemical industry wastes
Ivan Mikhailov, Y. Konuhov, D. Ryzhonkov, M. Kostitsyn
National University of Science and Technology "MISiS", Moscow, Russia

17.15 – 17.30 Photocatalytic efficiency of TiO_2 nanopowders prepared by sol-gel route in degradation of metoprolol in water suspension
Sanja Armaković[1], Biljana Abramović[1], Maja Šćepanović[2], Aleksandar Golubović[2]
[1]*Department of Chemistry, Biochemistry and Environmental Protection, Faculty of Sciences, University of Novi Sad, Novi Sad, Serbia*, [2]*Institute of Physics, University of Belgrade, Belgrade, Serbia*

17.30 – 17.45 Aerosol-assisted low-temperature processing of colloidal TiO_2 nanoparticles: two different manners for improving the optical properties
Ivan Dugandžić[1], Dragana Jovanović[2], Lidija Mančić[1], Zoran Šaponjić[2], Olivera Milošević[1], Jovan Nedeljković[2]
[1]*Institute of Technical Sciences of SASA, Belgrade, Serbia*, [2]*Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia*

17.45 – 18.00 Goethite nanoparticles synthesized with addition of various surface active substances
Alexander N. Antonov[1], E.A. Kolesnikov[2]
[1]*Moscow State University, Moscow, Russia*, [2]*National University of Science and Technology, Moscow, Russia*

18.00 – 18.15 Surface plasmon resonance of Ag organosols: Experimental and theoretical investigations
Ivana Vukoje, Dusan Božanić, Vesna Vodnik, Una Bogdanović, Jovan Nedeljković
Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia

18.15 – 18.30 Features of the nanostructured materials based on the quantum dots
Natalia A. Shurpo, Natalia V. Kamanina
Vavilov State Optical Institute, St.-Petersburg, Russia

18.30 – 18.45 Removal of copper from aqueous solutions using a fluidized bed reactor
Mina Jovanović, Srdjan Vidović, Nevenka Rajić, Bojana Obradović
Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

Friday, December 23, 2011
Hall 2, 1st floor, Knez Mihailova 36

09.00 – 10.45 8th Session – Synthesis and Processing of Materials – Part I

Chairpersons: Dr. Nikola Cvjetićanin, Dr. Ivana Stojković and Mateusz Piz

09.00 – 09.15 Phase relations in the Nb_2SbVO_{10}–Sb_2O_4 system in the solid state

Mateusz Piz, Elżbieta Filipek
West Pomeranian University of Technology, Szczecin; Faculty of Chemical Technology and Engineering; Department of Inorganic and Analytical Chemistry; Szczecin, Poland

09.15 – 09.30 Optimization of technology of thermoelectric materials based on Bi_2Te_3

Andrey Voronin, Vladimir Bublik, Natalia Tabachkova, Andrey Usenko
National University of Science and Technology "MISIS", Moscow, Russia

09.30 – 09.45 Building products based on fly ash

Milica Arsenović, Anja Terzić, Zagorka Radojević
Institute for Testing of Materials, Belgrade, Serbia

09.45 – 10.00 Photoacoustic response of thin films – thermal memory influence

Mioljub Nešić[1], Marica Popović[1], Zoran Stojanović[1], Zlatan Šoškić[2], Slobodanka Galović[1,2,3]
[1]Institute of Nuclear Sciences Vinča, University of Belgrade, Serbia, [2]Faculty of Mechnical Engineering Kraljevo, University of Kragujevac, Serbia, [3]Bogolyubov Laboratory for Theoretical Physics, JINR, Dubna, Russia

10.00 – 10.15 Study of the electrothermal switching effect in bulk glassy semiconductor $Cu_{15}(AsSe_{1.4}I_{0.2})_{85}$

Miloš P. Slankamenac[1], Svetlana R. Lukić-Petrović[2], Miloš B. Živanov[1], Kristina Čajko[2]
[1]University of Novi Sad, Faculty of Technical Sciences, Centre for Integrated Microsystems and Components, Novi Sad, Serbia, [2]University of Novi Sad, Faculty of Sciences, Department of Physics, Novi Sad, Serbia

10.15 – 10.30 Atomic force microscopy and UV-VIS spectroscopy characterization of carbon quantum dots

Djordje Klisić[1], Duška Kleut[2], Dejan Kepić[2], Zoran Marković[2]
[1]Electrotechnical Faculty, University of Belgrade, Serbia, [2]Vinča Institute for Nuclear Science, University of Belgrade, Belgrade, Serbia

10.30 – 10.45 Thin transparent conductive graphene films with PVP

Duška Kleut[1], Dejan Kepić[1], Zoran Marković[1], Ivanka Holclajtner Antunović[2], Davor Peruško[1], Biljana Todorović Marković[1]
[1]Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia, [2]Faculty of Physical Chemistry, University of Belgrade, Beograd, Serbia

10.45 - 11.00 Break

11.00 – 13.00 9th Session – Synthesis and Processing of Materials – Part II

Chairpersons: Dr. Nebojša Mitrović, Agnieszka Pacześna and Marija Petković

11.00 – 11.15 Z-scan measurement of nonlinear optical properties
Ana Joža, Bojan Dakić, Dragan Z. Stupar, Jovan Bajić, Miloš P. Slankamenac, Miloš Živanov
University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia

11.15 – 11.30 Pelletized fly ash – a new aggregate for lightweight concrete
Dragoljub Birčević[1], Sanja Bajić[1], Radmila Gaćina[1], Lukaš Koval[2], Rudolf Tomanec[1]
[1]Faculty of Mining and Geology, University of Belgrade, Serbia, [2]Technical University Ostrava, Czech Republic

11.30 – 11.45 Synthesis and some properties of new ternary oxide in the V_2O_5-NiO-In_2O_3 system
Agnieszka Pacześna, Elżbieta Filipek
West Pomeranian University of Technology, Szczecin; Faculty of Chemical Technology and Engineering; Department of Inorganic and Analytical Chemistry; Szczecin, Poland

11.45 – 12.00 Alloy characterization of ternary Ni-Pb-Sb system
Milena Premović[1], Duško Minić[1], Dragan Manasijević[2], Dragana Živković[2]
[1]University in Priština, Faculty of Ttechnical Science, Kosovska Mitrovica, Serbia, [2]University of Belgrade, Technical Faculty, Bor, Serbia

12.00 – 12.15 Characterisation of bronze surface coatings on titanium formed by plasma electrolytic oxidation in 12-tungstosilicic acid
Marija Petković[1], S. Stojadinović[1], R. Vasilić[2], I. Belča[1], B. Kasalica[1], Lj. Zeković[1]
[1]Faculty of Physics, University of Belgrade, Belgrade, Serbia, [2]Faculty of Environmental Governance and Corporate Responsibility, Educons University, Sremska Kamenica, Serbia

12.15 – 12.30 Influence of thermal treatment on structural, morphological and optical characteristics of upconvertors
Vesna Lojpur[1], Lidija Mančić[1], Maria Eugenia Rabanal[2], Miroslav Dramićanin[3], Olivera Milošević[1]
[1]Institute of Technical Sciences of SASA, Belgrade, Serbia, [2]University Carlos III of Madrid, Dept. of Material Science and Engineering and Chemical Engineering, Leganes, Madrid, Spain, [3]Institute of Nuclear Science "Vinča", University of Belgrade, Belgrade, Serbia

12.30 – 12.45 Raman spectroscopy of gamma irradiated single wall carbon nanotubes
Svetlana Jovanović[1], Zoran Marković[1], Ivanka Holclajtner Antunović[2], Biljana Todorović Marković[1]
[1]Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia, [2]Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia

12.45 – 13.00 Electrospun PVB-SiO_2 composite fibers: morphology, properties and ballistic applications
Vera Obradović[1], Aleksandar Kojović[1], Dušica B. Stojanović[1], Nebojša D. Nikolić[2], Irena Živković[1], Petar S. Uskoković[1], Radoslav Aleksić[1]
[1]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia, [2]ICTM-Institute of Electrochemistry, University of Belgrade, Belgrade, Serbia

13.00 - 14.15 Lunch break with refreshments

14.15 – 16.00 10th Session – Various Problems of Materials Science
Chairmen: Dr. Edin Suljovrujić and Jingjie Yeo

14.15 – 14.30 Investigating nanoporous silica aerogel obtained through negative pressure rupturing - A molecular dynamics study
Jingjie Yeo[1,2], Teng Yong Ng[1], Zishun Liu[2]
*[1]School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore, Republic of Singapore, [2]Institute of High Performance Computing, Agency for Science, Technology and Research (A*STAR), Fusionopolis, Connexis, Singapore, Republic of Singapore*

14.30 – 14.45 Comparative analysis of different methods for graphene nanoribbon synthesis
Dragana Tošić, Zoran Marković, Svetlana Jovanović, Momir Milosavljević, Biljana Todorović Marković
Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia

14.45 – 15.00 Complex impedance spectroscopy of Ti doped α–Fe_2O_3
Dalibor L. Sekulić[1], Maria Vesna Nikolić[2], Miloš P. Slankamenac[1], Miloš B. Živanov[1]
[1]Faculty of Technical Sciences, University of Novi Sad, Serbia, [2]Institute for Multidisciplinary Research, University of Belgrade, Serbia

15.00 – 15.15 Frequency up-converter for silicon solar cells based on multiple quantum wells realized in nonpolar a-plane GaN/AlGaN
Sanja Radosavljević[1], Jelena Radovanović[1], Vitomir Milanović[1], S. Tomić[2]
[1]School of Electrical Engineering, University of Belgrade, Belgrade, Serbia, [2]Joule Physics Laboratory, School of Computing, Science and Engineering, University of Salford, Salford, United Kingdom

15.15 – 15.30 Assessment of safety valve springs failure
Ana Alil, Bojan Gligorijević, Mirjana Prvulović, Stevan Budimir, Marko Ristić, Milan Prokolab
Institute Goša, Belgrade, Serbia

15.30 – 15.45 Technology of obtaining alloy powder CoCrAlYSi
Olga P. Vasilega, N.I. Grechanyuk, V. G. Zatovskyi
Frantsevich Institute for Problems of Materials Science of NASU, Kiev, Ukraine

15.45 – 16.00 Comparison of structural modifications of SWCNT thin films treated by laser and thermal irradiation
Dejan P. Kepić[1], Zoran M. Marković[1], Ivanka D. Holclajtner Antunović[2], Marko G. Nikolić[1], Miroslav D. Dramićanin[1], Biljana M. Todorović Marković[1]
[1]Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia, [2]Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia

16.00 - 16.15 Break

16.15 – 18.30 11th Session – Polymer Science

Chairpersons: Dr. Gordana Ćirić-Marjanović and Karol Lušpai

16.15 – 16.30 Swelling and biocompatibility behavior of P(HEA/IA/PEGDMA) hydrogels
Jovana S. Jovašević[1], Marija D. Vojisavljević[1], Bojana D. Krezović[1], Jovanka M. Filipović[3], Edin H. Suljovrujić[2], Simonida Lj. Tomić[1]
[1]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia, [2]Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia, [3]Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

16.30 – 16.45 Thermoresponsive silver/poly(N-isopropylacrylamide) hydrogel nanocomposites synthesized by gamma irradiation
Jelena Spasojević[1], Jelena Krstić[1], Aleksandra Radosavljević[1], Melina Kalagasidis-Krušić[2], Zorica Kačarević-Popović[1]
[1]Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia, [2]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

16.45 – 17.00 Chitosan/poly(vinyl alcohol) blend as a capping agent for gamma irradiation induced *in situ* synthesis of silver nanoparticles
Jelena Krstić, Jelena Spasojević, Aleksandra Radosavljević, Miodrag Mitrić, Zorica Kačarević-Popović
Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia

17.00 – 17.15 Adsorption kinetics of Bezactiv Orange V-3R dye on chitosan/montmorillonite membranes
Aleksandra Nešić[1], Sava Veličković[2], Dušan Antonović[2]
[1]Vinča Institute of Nuclear Sciences, Belgrade, Serbia, [2]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

17.15 – 17.30 ESR/UV-VIS-NIR spectroelectrochemical study of the charging the SWCNT/oligothiophene interphase
Karol Lušpai[1,2], Kinga Haubner[1], Peter Rapta[1,2], Lothar Dunsch[1]
[1]Center of Spectroelectrochemistry, Department of Electrochemistry and Conducting Polymers, Leibniz Institute for Solid State and Material Research, Dresden, Germany, [2]Institute of Physical Chemistry and Chemical Physics, Slovak University of Technology in Bratislava, Bratislava, Slovak Republic

17.30 – 17.45 Synthesis of polyaniline by dopant-free interfacial polymerization of aniline
Aleksandra A. Rakić, Gordana N. Ćirić-Marjanović
Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia

17.45 – 18.00 Tetrabutylamoniumbibenzoate catalyzed group transfer copolymerization of tert-butyl methacrylate
Dragutin Nedeljković[1], Aleksandar Grujić[1], Aleksandar Stajčić[1], Jasna Stajić-Trošić[1], Jasmina Stevanović[1], Radoslav Aleksić[2]
[1]Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia, [2]University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia

18.00 – 18.15 Investigation of reaction kinetics of polyurethane preparation based on vegetable oil
Bojan Milankov, Zoran Bjelović, Mirjana Jovičić, Biljana Švonja, Ivan Ristić, Jaroslava Budinski-Simendić, Branka Pilić
University of Novi Sad, Faculty of Technology, Novi Sad, Serbia

18.15 – 18.30 Influence of kaolinite microstructure on its adsorption capacity for Cu(II)
Mia Omeragević[1], Uroš Jovanović[2], Jelena Pantić[1], Tamara Tuvić[2], Vladimir Pavlović[3], Snežana Nenadović[1], Branko Matović[1]
[1]Laboratory for Material Science, Institute of Nuclear Sciences "Vinča", University of Belgrade, Belgrade, Serbia, [2]Laboratory of Chemical Dynamics and Permanent Education, Institute of Nuclear Sciences Vinča", University of Belgrade, Belgrade, Serbia, [3]Faculty of Agriculture, University of Belgrade, Belgrade, Serbia

18.30 Closing Ceremony

I/1

Design, synthesis and evaluation of non-urea inhibitors of soluble epoxide hydrolase

Stevan Pecic[1], Shi-Xian Deng[1], Christophe Morisseau[2], Bruce D. Hammock[2], Donald W. Landry[1]

[1]Department of Medicine, Columbia University, New York, NY, USA,
[2]Department of Entomology and UCD Cancer Center, University of California, Davis, CA, USA

Inhibition of soluble epoxide hydrolase (sEH) has been proposed as a new pharmaceutical approach for treating hypertension and vascular inflammation. The most potent sEH inhibitors reported in literature to date are urea derivatives. However, these compounds have limited pharmacokinetic profiles. We investigated non-urea amide derivatives as sEH inhibitors and identified a potent human sEH inhibitor having potency comparable to urea-based inhibitors.

I/2

Synthesis, characterization and sintering properties of Zr-doped hydroxyapatite

Miodrag J. Lukić[1], Srečo D. Škapin[2], Smilja Marković[1], Dragan Uskoković[1]

[1]Center for Fine Particles Processing and Nanotechnologies, Institute of Technical Sciences of SASA, Belgrade, Serbia, [2]Advanced Materials Department, Jožef Stefan Institute, Ljubljana, Slovenia

Improving of material characteristics could be achieved in different ways, but it is always connected with the issue of impairing the other functional properties. Hydroxyapatite bioceramics lacks of insufficient mechanical properties for load-bearing implant applications. Nowadays, making of composites, nanostructuring and doping of basic material are some of the promising pathways for hydroxyapatite toughening.

Until now, Zr is not considered as fortifying dopant in hydroxyapatite based materials. However, it could be interesting in the sense of nontoxicity, preserved biocompatibility and incorporation in hydroxyapatite crystal lattice since it possesses lower crystalographic radius.

In this study, preliminary experiments of chemical precipitation are performed to obtain hydroxyapatite with various Zr content. The crystal phase composition, particle size and morphology changes compared to pure hydroxyapatite are studied. Sintering is performed to find appropriate conditions for fabrication of dense material. Vickers hardness and fracture toughness were also measured.

I/3

One – pot synthesis of hydrophobic hydroxyapatite nano particles

Zoran Stojanović, Miodrag Lukić, Dragan Uskoković

Institute of Technical Sciences of SASA, Belgrade, Serbia

A highly hydrophobic oleic acid functionalized hydroxyapatite nanoparticles were obtained by the solvothermal method. Water solutions of reactants were added in mixture of oleic acid, triethanolamine and ethanol, which was then treated in Teflon lined autoclave. The chemical composition, size and morphology of as obtained particles were determined using XRD, FT IR, FE SEM and LD PSA. In addition, sintering behaviour and microstructure of prepared material were also examined.

I/4

Synthesis and the effect of processing parameters on characteristics of poly-ε-caprolactone micro- and nanospheres

Nenad Filipović[1], Magdalena Stevanović[1], Vladimir Pavlović[1, 2], Aleksandra Radulović[3], Zoran Stojanović[1], Dragan Uskoković[1]

[1]Institute of Technical Sciences of SASA, Belgrade, Serbia, [2]Faculty of Agriculture, University of Belgrade, Belgrade, Serbia, [3]Institute of General and Physical Chemistry, Belgrade, Serbia

Poly-ε-caprolactone (PCL) is a semicrystalline, biodegradable and biocompatible polymer. Its advantages, as high permeability to small drug molecules, failure to generate an acidic environment during degradation (as compared to polylactides and polyglycolides) and a slow degradation rate, make this aliphatic polyester suitable for extended long-term delivery over a period of more than one year. In this study PCL particles were prepared by physicochemical method with solvent/non-solvent systems. The synthetic polymer polyvinylpyrrolidone (PVP) and natural polymer poly (α, γ, L-glutamic acid) (PGA), were used as stabilizers and their influence on size and morphology of the particles was examined. The results were compared with those obtained without the use of stabilizers. Characterization of obtained particles was performed by Fourier transform infrared spectroscopy. The morphology and size distribution were determined using SEM and particle analyzer.

I/5

Multilayered core-shell nanoparticle model for biomaterials delivering

Stevan Armaković[1], Ana J. Šetrajčić-Tomić[2], Igor J. Šetrajčić[1]

[1]*University of Novi Sad, Faculty of Sciences, Department of Physics, Vojvodina – Serbia*
[2]*University of Novi Sad, Medical Faculty, Department of Pharmacy, Vojvodina – Serbia*

We analyzed application of nanomaterials in biomedicine, that is to say we will present the recent accomplishments in basic and clinical nanomedicine. Achieving full potential of nanomedicine may be years or even decades away, however, potential advances in drug delivery, diagnosis, and development of nanotechnology-related drugs start to change the medicine. Implants, especially in dentistry, due to new biomaterials and thin coatings with specific tasks, are now widely used. Based on our research in ultra-thin crystalline structures performed so far, we will consider the core-shell multilayer materials that can act as carriers for medicines and tagged substances.

I/6

Controlled release of aspirin from surfactant-modified natural zeolite

Sanja Jevtić[1], Svetlana Grujić[1], Gregor Mali[2], Nevenka Rajić[1]

[1]*University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia,*
[2]*National Institute of Chemistry, Ljubljana, Slovenia*

Natural zeolite (NZ) from south region of Serbia has been investigated as a carrier for controlled release of aspirin. In order to modify the adsorption ability of zeolite, NZ was pretreated with cationic surfactant - benzalkonium chloride (BC). Aspirin release from the composite NZ-BC displays two stages. The first stage occurs within first 15 minutes whereas the second one proceeds gradually over 6 hours. Release profile indicates that the delivery is controlled by a diffusion process in the first stage and by the electrostatic interaction between the drug and surfactant in the second stage.

I/7

Investigation on the potential application of thermosensitive hydrogels for controlled release of phenacetin

Snežana Ilić-Stojanović[1], Ljubiša Nikolić[1], Vesna Nikolić[1], Mihajlo Stanković[1], Slobodan Petrović[2], Jela Milić[3]

[1]University of Niš, Faculty of Technology, Leskovac, Serbia, [2]University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia, [3]University of Belgrade, Faculty of Pharmacy, Belgrade, Serbia

Many scientific researches over the past few years have been focused on hydrogels containing N-isopropylacrylamide (NIPAM) as monomer. NIPAM based hydrogels with 20 mol. % 2-hydroxypropylmethacrylate (HPMet), p(NIPAM-HPMet), were synthesized using a variety of the molar ratios of crosslinker ethylene glycol dimethacrylate (EGDMA), also their characterization was performed. FTIR spectrum of xerogel indicates the performed synthesis by the initiation of radicals. SEM micrographs show the porous surfaces of xerogels. Potential applications of synthesized hydrogels as drug carriers for controlled release were investigated by HPLC method. The results show that the thermosensitive p(NIPAM-HPMet) hydrogel with 1 mol.% EGDMA has the highest porosity, exhibits the highest degree of swelling at 20 °C and releases the largest amount phenacetin (0.043mg/cm^3) at 40 °C.

The financial support of the Ministry of Education and Science, Republic of Serbia (the project TR 34012) is gratefully acknowledged.

I/8

Production and characterization of hydrogel nanocomposites based on alginate and poly(vinyl alcohol) with incorporated silver nanoparticles

Milena Nemet, Jasmina Stojkovska, Željka Jovanović, Vesna Mišković-Stanković, Bojana Obradović

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

Nanocomposite hydrogels with incorporated silver nanoparticles (AgNPs) provide variety of potential applications as antimicrobial agents in fields ranging from biomedicine and pharmacy to environmental engineering. In this work, we have combined electrochemical synthesis of AgNPs in alginate solution and different gelation methods (ion exchange, freezing-thawing) in order to produce nanocomposite hydrogels based on alginate and poly(vinyl alcohol) (PVA) in different forms (discs, beads, microbeads). The novel nanocomposites were characterized regarding biomechanical properties in a biomimetic bioreactor and antimicrobial activity against *Escherichia coli*. The results have shown potentials of the novel technique for production of different nanocomposite hydrogels with controlled properties.

I/9

Comparison of corrosion resistance between composite silver/hydroxyapatite/lignin (Ag/HAP/Lig) and hydroxyapatite/lignin (HAP/Lig) coatings in simulated body fluid

Sanja Eraković[1], Rade Surudžić[1], Djordje Veljović[1],
Tatjana Stevanović[2], Djordje Janaćković[1], Vesna Mišković-Stanković[1]

[1]*Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia*
[2]*Département des sciences du bois et de la forêt, Université Laval, Québec, Canada*

Nowdays the composite hydroxyapatite (HAP) coatings containing biopolymers, such as lignin (Lig), attract grate interest as a coating material for metallic implants. In order to prevent infection the composite coatings are doped with silver. The chosen concentration in Ag/HAP/Lig coating was 0.5 wt. % Ag and characterized by various techniques. The corrosion stability of sintered HAP/Lig and Ag/HAP/Lig coatings in simulated body fluid (SBF) at 37 °C during 48 h was investigated by open circuit potential–time measurements and electrochemical impedance spectroscopy (EIS). It was shown that both composite coatings exhibited good corrosion stability in SBF solution.

II/1

Assessment of the effects of nanoparticles of CP/PLGA on cultures of different cell lines

Stevo Najman[1], Sanja Stojanović[1], Jelena Najdanović[1], Nenad Ignjatović[2], Dragan Uskoković[2]

[1]University of Niš, Faculty of Medicine, Institute of Biology and Human Genetics, Serbia
[2]Institute of Technical Sciences of SASA, Belgrade, Serbia

The aim of this study was to examine the effects of nanoparticles of calcium phosphate/poly-(DL-lactide-co-glycolide) (NPs-CP/PLGA) on viability and growth of different cell lines *in vitro*. HeLa and MDCK cells were incubated with different concentrations of suspension and extract of NPs-CP/PLGA. Concentrations of suspension were in the range from 1.6 μg/ml to 5000 μg/ml and extract in the range from 2.5% to 50%. After incubation, MTT test was performed. Our results indicate that examined nanomaterial shows different effects depending on type of the cells, applied concentration of nanomaterial as well as whether it is examined suspension or extract.

II/2

Antibacterial activity of the copper-loaded zeolite

Jelena Milenković[1], Jasna Hrenović[2], Nevenka Rajić[3]

[1]Innovation Centre of the Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia, [2]University of Zagreb, Faculty of Science, Division of Biology, Zagreb, Croatia, [3]University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia

The aim of this study was to investigate the antibacterial activity of the copper-loaded natural zeolite (from Vranjska Banja deposit) towards Gram-negative (*Escherichia coli*) and Gram-positive (*Staphylococcus aureus*) bacteria present in different water solutions - Luria Bertani (LB) medium, synthetic wastewater and real effluent water. The number of bacteria was measured as colony forming units (CFU) grown on LB agar after 24 h of incubation at 37 °C.

The copper-loaded natural zeolite exhibits an excellent antibacterial activity and therefore could find application as a disinfectant in the final step of wastewater treatment.

II/3

Morphology controlled hydrothermal synthesis of ZnO particles and examination of their antibacterial properties on *Escherichia coli* and *Staphylococus aureus* bacterial cultures

Ana Stanković[1], Ljiljana Veselinović[1], Smilja Marković[1], Suzana Dimitrijević[2], Srečo D. Škapin[3], Dragan Uskoković[1]

[1]Institute of Technical Sciences of SASA, Belgrade, Serbia, [2]Faculty of Technology and Metallurgy, University of Belgrade, Serbia, [3]Jožef Štefan Institute, Ljubljana, Slovenia

ZnO nanoparticles represent a very important metal oxide because of its great application potential. Beside optical and electrical properties, ZnO has exceptional antimicrobial properties and that is the reason why today a lot of attention is given to its study in health-related research. Although the *in vitro* antibacterial activity and efficiency of bulk zinc oxide material have been investigated, knowledge about the antibacterial activity of ZnO nanoparticles is very deficient. In this work we examined how the morphology and size of synthesized ZnO particles will have an effect on its antibacterial activity. Using a hydrothermal synthesis method we produced ZnO particles of different shape and dimensions. Varying the pH value of the starting reaction solution from 8 to 12, we managed to control particles morphology from micro-rods to nanospheres. Characterization of the prepared powders was preformed using a XRD, FE SEM, HR TEM technique and Malvern's Master Sizer instrument for particle size distribution.

The antibacterial behaviour of ZnO nanoparticles were tested to gram-negative and grm-positive bacterial cultures, *Escherihia coli (E. coli)* and *Staphylococus aureus (S. aureus)*. In all synthesized samples, ZnO nanoparticles demonstrated a significant bacteriostatic activity. The activity of the prepared powders was compared to antibacterial activity of the commercial ZnO powder (ZnO 99%, Aldrich).

II/4

Fullerenol $C_{60}(OH)_{24}$ decrease DNA damages on human lymphocytes

Jasminka Mrdjanović[1], Slavica Šolajić[1], Višnja Bogdanović[1], Aleksandar Djordjević[2], Gordana Bogdanović[1], Rade Injac[3], Zlatko Rakočević[4]

[1]Oncology Institute of Vojvodina, Experimental Oncology Department, Sremska Kamenica, Serbia, [2]University of Novi Sad, Faculty of Science, Department of Chemistry, Novi Sad, Serbia, [3]Faculty of Pharmacy, University of Ljubljana, Ljubljana, Slovenia, [4]Institute "Vinča" of Nuclear Sciences, Belgrade, Serbia

Fullerenol $C_{60}(OH)_{24}$ nanoparticles (FNP), posses a great potential for biomedical application. We evaluated physicochemical properties of FNP in water and culture medium by measuring of FNP number distribution and by atomic force microscopy (AFM). We also analyzed genotoxic and antigenotoxic effects of FNP on human peripheral blood lymphocytes using micronucleus test.
FNP number distributions and AFM showed that predominant particles were around 90 nm and 200 nm respectively. Micronucleus assay revealed that FNP decreased micronucleus frequency on undamaged and mitomycinC-damaged lymphocytes at subcytotoxic concentration.

FNP did not exhibit genotoxic but induced antigenotoxic effects at subcytotoxic concentrations on human lymphocytes.

II/5

The rabbit gingival tissue response to retraction liquids and tetrahydrozoline

Ivan Kostić[1], Dragan Mihailović[2], Stevo Najman[1], Sanja Stojanović[1], Milena Kostić[3]

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[2]University of Niš, Faculty of Medicine, Institute of Pathology, Serbia,
[3]Clinic of Dentistry Niš, Department of Prosthodontics, Serbia*

The aim of the study was a comparative analysis of the effects of different retraction materials and tetrahydrozoline on gingival tissue. The research started from the assumption that tetrahydrozoline is a biologically more acceptable means of gingival retraction than commercially available preparations.

The effect of retraction liquids on the basis of aluminum chloride and epinephrine, as well as alternative tetrahydrozoline hydrochloride on gingival tissue of rabbits was investigated. The application time in the rabbit's gingival sulcus was seven minutes. The tissue biopsy was performed after one hour, one, seven and thirty days. Tissue preparations were analyzed histopathologically.

Application of retraction liquids led to an acute inflammatory response which in time assumed a chronic character. Use of tetrahydrozoline resulted in a visibly weaker inflammatory response.

II/6

Joint effects of vitamin D and nanobiomaterial in the jaw bone regeneration

Zorica Ajduković[1], Nenad Ignjatović[2], Nenad Petrović[1],
Vojin Savić[3], Dragan Mihailović[4], Dragan Uskoković[2]

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Systems for targeted delivery of drugs with high affinity for specific organs, tissues, and cells were introduced at the beginning of the twentieth century. Recently, this concept is attracting much attention. These systems have shown most affective in reducing adverse effects of drugs. In recent years, scientists have created a system of nanoparticles for delivery of vitamin D. Special attention is paid to the role of vitamin D in the division and differentiation of osteoblasts and thus, in its role in osteogenesis. In this regard it was interesting to observe the local effects of the active form of vitamin D3 in osteogenesis, as a part of the system for local delivery. These effects were observed on an experimental model. Three types of nanobiomaterial were implanted in the artificially made defects in rats' mandibular bone. Six weeks after implantation of hydroxyapatite, hydroxyapatite-coated vitamin D3 and hydroxyapatite nanoparticles coated with vitamin D3 mixed with the polymer, the animals were sacrificed, and the samples of mandibular alveolar bone were taken. The samples were adequately prepared and subjected to histopathological analysis. The best results in regeneration of osteoporotic jaw bone were obtained in the experimental group of animals where the implant was hydroxyapatite-coated vitamin D3 mixed with the polymer. The results show that nanobiomaterials with local delivery of active form of vitamin D3, used in this study, may be materials of the future in the area of weakened jaw bone tissue regeneration.

II/7

Applicability of neural networks in the estimation of brain iron content in the diagnosis of amyotrophic lateral sclerosis

Miloš Milović[1], Miloš Mojović[2], Aleksandar Ignjatović[2]

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[2]*Faculty of Physical Chemistry, Belgrade University, Belgrade, Serbia*

Artificial Neural Networks, or simply ANN, are mathematical/computational model that are inspired by structure and functional aspects of biological neural networks. ANN, like man, learns by example. In the process of network training, network is supplied with set of data which represents examples of network's proper behaviour. In the research we have done, neural network is created with the task to estimate the iron content in the brain of the Amyotrophic Lateral Sclerosis (ALS) patients. Network is created and trained using Neural Pattern Recognition Tool within the software package Matlab v7.10.0.499 (R2010a). Network is trained with set of data obtained from group of 50 ALS patients. Training set contains: (i) MRI signal of brain iron, (ii) EPR signal of hydroxyl radical from cerebrospinal fluid and (iii) score on ALS Functional Rating Scale (ALSFRS) for each patient individually. The results indicate that neural networks can be successfully used to predict the high content of iron in the brain, which in the perspective opens up the possibility of using this computer model as a standard tool in the diagnosis of ALS.

II/8

Silver/alginate nanocomposites: Biomedical potential of silver/alginate microbeads

Željka Jovanović[1], Jasmina Stojkovska[1], Maja Vukašinović-Sekulić[1], Ivana Matić[2], Zorica Juranić[2], Bojana Obradović[1], Vesna Mišković-Stanković[1]

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In this study, biomedical potential of Ag/alginate nanocomposites was evaluated by investigation of biomechanical properties under *in vivo*-like conditions in bioreactor with dynamic compression and medium perfusion, antibacterial activity and cytotoxicity by MTT test. Determination of cytotoxic action of Ag/alginate nanocomposites at 0.5 mM dm^{-3} of $AgNO_3$ in the initial solution for synthesis, to immunocompetent PBMC showed decrease in PBMC survival to (74.95 ± 5.36) %, and to stimulated for proliferation by mitogen PHA PBMC to (63.73 ± 7.80) %. Higher concentration of Ag in Ag/alginate nanocomposites (1 mM dm^{-3} of $AgNO_3$) induced decrease in PBMC survival to (59.04 ± 35.45) and to PHA-stimulated PBMC to (57.01 ± 24.63) %. Presence of Ag/alginate nanocomposites that contained higher concentrations of silver induced pronounced decrease in healthy unstimulated and PHA-stimulated PBMC.

II/9

Influence of anion type on the structure of pectin gels crosslinked with copper

Sanja Šešlija[1], Jasmina Stevanović[2], Tatjana Volkov-Husović[1], Sava Veličković[1]

[1]Faculty of Technology and Metallurgy, University of Belgrade , Belgrade, Serbia, [2]Institute of Chemistry, Technology and Metallurgy, Department of Electrochemistry, Belgrade, Serbia

The purpose of this study was to examine the influence of anions present in copper salts used for pectin gelation. It is known that metal ions readily crosslink pectin, but the influence of anion type was not investigated in detail.

Pectin hydrogels were formed using five different copper salts: Cu_2Cl_2; $CuCl_2$; $CuSO_4$; $Cu(NH_2SO_3)_2$ $x2H_2O$; $Cu(C_2H_3O_2)_2$ xH_2O. Highly methylated pectin was dissolved in water and added drop-wise to aqueous salt solutions forming spheres. The dependence of spheres' size on the concentration of salt solutions was studied using image analysis, while the binding of metals and presence of anions was confirmed by FTIR.

II/10

Effect of water immersion on the tensile bond strengths of four soft reliners to a denture base resin

Dušan Petković[1], Milena Kostić[2], Dimitrije Petrović[2], Nebojša Krunić[2], Goran Radenković[1]

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In clinical practice, loss of adhesion between the denture base resin and reliner might cause loss of material softness, water sorption, bacterial colonization and functional failure of the prosthesis. This study evaluated the effect of immersion on tensile bond strengths of four soft liner materials to a denture base acrylic resin.

Four soft lining materials were bonded to heat-polymerized acrylic resin according to manufacturers' directions. Forty specimens (15 x 2 mm cross-sectional area) for bond strength test (10 for each liner type) were fabricated. The half of them (control groups; n=5) tested right after fabrication. The other twenty specimens stored in water at 37°C (test groups; n=5) for one week and then tested. The specimens were tested on tensile strength in an universal testing machine with at crosshead speed of 20 mm/min until fracture. Tensile force and deformation were recorded. Bond strength means were compared between non-treated and water-stored groups for each material, as well as among materials for each treatment (non-treated or water storage). Failure mode (adhesive, cohesive and mixed) after debonding was assessed.

The bond strengths of the four soft denture reliners tested in this study were changed with their chemical composition. All soft lining materials tested in this study showed a significant change in the bond strength to an acrylic denture base resin after water-stored.

III/1

Mechanochemical synthesis of the copper-doped calcium titanate

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It is shown that mechanochemical treatment of calcium and titanium oxides simultaneously with certain amount of copper oxide allows synthesizing doped materials such as $Ca_{1-x}Cu_xTiO_3$ ($0<x\leq0.75$) as well as $CaTi_{1-x}Cu_xO_{3-\delta}$ ($0<x\leq0.6$) with perovskite structure. Presence of copper ions improves the electrical properties of $CaTiO_3$.

Mechanical treatment was realized by high-energy milling using laboratory planetary ball mill (Activator 2S, Novosibirsk). The characteristics of milling products were determined using X-ray powder diffraction patterns (XRD) and scanning electron microscopy (SEM).

The results of dielectric measurements for different amount of Cu ions, as a function of temperature, are presented.

III/2

Sintering of mechanically activated $MgO\text{-}TiO_2$ system

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Mixtures of $MgO\text{-}TiO_2$ powders were mechanically activated in planetary ball mill for time interval from 0 to 120 minutes. The influence of mechanical activation on phase composition and crystal structure was analyzed by XRD, while the effect of activation and sintering process on microstructure was investigated by scanning electron microscopy. Using a data obtained by XRD microstructure parameters, values of crystallite size (D), density of dislocation (ρ_D) and lattice strain (e_{hkl}) were calculated. Dielectric measurements are performed in order to show difference in dielectric constant as a function of time of mechanical activation.

III/3

Mechanochemical synthesis $Ba_{0.8}Sr_{0.2}TiO_3$

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$Ba_{0.8}Sr_{0.2}TiO_3$ was prepared from the starting materials $BaCO_3$, $SrCO_3$ and TiO_2 through solid state reaction. Mixture of these oxides was mechanically activated using a high-energy ball mill at different time intervals from 0 to 120 minutes. The crystal structure was determined by X-ray diffraction to obtain information about the composition of phase variation. It was observed that after 40 minutes occurred early synthesis $Ba_{0.8}Sr_{0.2}TiO_3$. Particle size distribution along with scanning electron microscopy gave very useful information about powder morphology.

III/4

Mechanomaking of boron crystal solid solution in fcc Fe-Ni alloys

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Boron does not form equilibrium solid solutions with iron. Using the method of ultra speed quenching (SQ) it is possible to obtain metastable solid solutions and to widen the area of their existence. As alternative to SQ, this research studied the possibility of mechanical dissolution of borides and formation of boron solid solutions in fcc Fe-Ni alloys using intensive cold plastic rotation deformation in Bridgman anvils.

To analyse the process of solid solutions formation, as in cases with carbon, nitrogen, and oxygen, it is necessary to take into account the dependent on temperature competitive processes of decay and extraction of secondary phases – borides in this case.

According to the data of Mossbauer spectroscopy, magnetic susceptibility and X-ray diffraction analysis the deformation-induced dissolution of boron and boron nitride particles in metal matrix under compression shear in rotating Bridgman anvils was stated. Boron interstitial supersaturated solid solution with concentration 1…3 at.% is formed as a result of dissolution of Fe-Ni alloy in fcc matrix. Supersaturated solid solution is unstable and coexists with metastable borides of $(FeNi)_3B$ type.

The possibility of formation of supersaturated crystal boron solid solutions in fcc - iron (to 3 at.% B) is promoted by the anomalously large growth of crystal lattice spacing and the volume of octahedral interstitial sites of γ-phase in the invar area of compositions.

The growth of $<H>$ and T_C , found with the help of NRG method, in Fe-Ni alloy of invar range at its mechanical synthesis with boron-containing components is comparable with the similar growth of these magnetic characteristics for the cases of alloying with carbon and nitrogen. Electron microscopy data show the formation of submicrostructure in invar matrix with multiple nanodimensional particles of boride phases and inclusions of undissolved boron. Mechanical synthesis of supersaturated boron solid solution in crystal matrix of Fe-Ni austenite makes it possible to use cold plastic compression shear deformation for nanostructurization and creation of secondary nanoboride phases.

IV/1

Thermal modelling of organic light emitting diode

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Thermal management in displays and lighting sources based on organic light emitting diodes (OLEDs) is critical because the degradation rate of organic materials increases exponentially with temperature. In this work, an attempt has been made for the simulation of heat extraction from OLED display panel, using COMSOL software package. OLED based display panel contain complex geometries that have very large variation in sizes, between 10-6m to 10-2m. Since the heat transport must be solved at the largest length scale, we have used an averaging method to estimate the property values and heat generation. Because the OLEDs are thin, the simulation would be sufficient in two dimensions. However, the top glass through which the display loses heat is thick. But because the heat transfer from glass surface to environment is slow, little temperature gradient exists across the display glass. Hence, it is found suitable to carry out a two dimensional simulation. During the simulation, Lagrange cubic element shape function has been used to improve the accuracy of result. Along the boundary of active display, a weak constraint has been used which further improves the numerical result. For smaller size display panel simulation has been done at250 and 2000 cd/m^2. After simulation, the maximum temperature zone in active display has been found out. A conclusion has been drawn that almost 96% of heat energy is coming out from the encapsulated glass with the convection and radiation process. Metal lines are not very effectively participating in cooling the OLED display panel. To increase the life time of OLED display panel a natural and forced convection process has been used for cooling. For further improving the life time, two ways cooling process has been used.

IV/2

Spin ordering in quasi-one-dimensional systems

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Physical properties of a particular system essentially depend on all geometrical transformations which leave that system unchanged. Such transformations form a group. Especially, quasi-one-dimensional systems, including well known nanotubes, can be analized within line groups' theory. Some specific properties like magnetic fenomena or spin ordering involve consideration of the time reversal also. In that sense, ionic spin arrangement in a quasi 1D systems must be invariant under corresponding magnetic (black-and-white) line group M(L)= L' + θ l* L', associated to the line group L= L' + l* L'; here L' is a halving subgroup of L, l* element of the remaining part of L, and θ is time reversal. Given spin of one ion only, we can find spin arrangements for all other ions in the same chemical species of the particular system; more precisely, the action of the magnetic line group M(L) distributes automatically spins along the orbit of the underlying ordinary line group L. We performed this task for all generic orbits of the line groups. Extending this concept to the multiorbit systems, i.e. with chemically different species we can get insight into the (anti)ferromagnetic properties of all quasi 1D systems.

IV/3

Carbon nanocoils: structure and stability

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Carbon nanocoils (CNC) are experimentally observed by Zhang et al. in 1994, shortly after being theoretically predicted by Ihara et al. Their geometrical structure is usually described by four parameters: tubular diameter, pitch, inclination and diameter of a coil.
Nowadays, CNC synthesized by CVD method, have various helical and tubular parameters and regularly coiled structures have periodic incorporation of pentagons and heptagons into the basic hexagonal carbon network.

Here, we construct model of single-wall helically coiled carbon nanotubes by means of graph theory and topological coordinates method. After getting three-dimensional coordinates of the atoms, we proceed with the relaxation by successive application of the following methods: 1) harmonic approximation; 2) molecular mechanics based on the Brenner potential; 3) density functional tight binding (DFTB).

Finally, by DFTB and line group symmetry implemented POLSym code, we calculate total and cohesive energy of the obtained fully relaxed structures of CNCs.

IV/4

Ab initio study of electronic structure and hyperfine interaction parameters in HfV2 and ZrV2 Laves phases

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Using the augmented plane wave plus local orbitals method we have performed calculations on C15 Laves phases HfV2 and ZrV2, within the framework of the density functional theory. Optimized structure, electronic properties and electric field gradients (EFG) have been calculated. In addition, supercell calculations of hyperfine interaction parameters at the nucleus positions of 181Ta and 111Cd were also carried out. Results for EFGs were compared with the available experimental data from differential perturbed angular correlation (TDPAC) measurements in order to elucidate the role played by 181Ta and 111Cd probes in TDPAC experiments.

IV/5

DFT investigation of intermetallic compounds for hydrogen storage applications

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The intermetallic compounds formed as a combination of hydride-forming and hydride-non-forming metals are the class of materials of special interest for hydrogen storage applications (solid state hydrogen storage, nickel metal-hydride batteries...). In this work, the results of DFT based calculations performed on intermetallic compounds of this type (with hydride forming metals being Ti, Zr, Hf and hydride non-forming metals Ni, Fe) and their hydrides are presented. The electronic structure and bonding in those materials as a function of composition and hydrogen content is discussed. In addition, the correlation between theoretical findings and experimental results is considered.

IV/6

New variant of the model of the Bray-Liebhafsky analytical matrix

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The Bray-Libhefsky (BL) reaction is known analytical matrix for quantitative analyte determination and catalyst characterization. For this purpose, the existing non-radical model with eight reactions is extended to include new reactions and species, particularly the important role of the $H_2I_2O_2$, in accordance with recent literature data. Validity of new variant of model is confirmed by the results of numerical simulations, which are in good agreement with experimental results for oscillatory evolution and kinetic characteristics of the BL reaction. Results contribute significantly the understanding of the interactions between BL matrix and analyte (catalyst).

IV/7

Bray-Liebhafsky oscillatory reaction as the matrix for testing the catalysts: Optimizations of conditions when reaction is performed in open reactor

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Since the oscillatory chemical reactions as nonlinear systems with several reaction routes are very sensitive to any perturbations, they apply as the matrix for characterization of heterogeneous catalysts. For this purpose various dynamic states and transitions between them (bifurcation points), obtained under open reactor conditions, must be defined and examined. Therefore, our investigations here are focused on construction of the bifurcation diagrams for different initial hydrogen peroxide concentrations in the case of the Bray-Liebhafsky reaction, where numerical calculations are based on corresponding well known model. The regions in vicinity of bifurcation points are identified as optimal conditions for catalyst tests.

V/1

Evaluation of TOFA/DETA imidazoline as corrosion inhibitor for top of the line corrosion (TLC) of mild steel in CO_2 environment

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The objective was to evaluate talloil diethylenetriamine imidazoline (TOFA/DETA imidazoline) as corrosion inhibitor and to investigate its inhibition efficiency on the top of the line when carried within a foam matrix. Corrosion rate was monitored using open circuit potential (OCP), electrochemical impedance spectroscopy (EIS), potentiodynamic sweep (PDS), linear polarization resistance (LPR) measurements in liquid phase as well as the electrical resistance (ER) measurements in vapour phase. It is shown that corrosion rate of mild steel in liquid phase decreases when TOFA/DETA imidazoline is added and also that the foam matrix with TOFA/DETA imidazoline provides significant inhibition at the top.

V/2

Surface analysis and corrosion stability of vinyltriethoxysilane films on aluminium in mild sodium chloride solution

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Nanometer-sized silane films, being environmentally compatible, are studied as new chromate substitutes for metallic surface pretreatements. Vinyl-containing silane is a coupling agent improving the performances of polymer materials, like weather resistance. Here, the influence of the solution concentration and curing time on the morphology and electrochemical properties of the vinyltriethoxysilane (VTES) films on aluminium in mild 0.03 % NaCl solution was investigated using XPS, SEM/EDS and EIS. The results obtained were compared with the standardized analysis in the salt spray chamber. VTES solution concentration exhibited more significant effect on the composition, morphology and corrosion stability than the curing time.

V/3

Electrodeposition of Zn-Mn alloys with high Mn percentage from chloride electrolyte

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The manganese addition can significantly improve the corrosion resistance of sacrificial Zn coatings. The best properties are obtained with 30 – 40 mass % Mn in Zn-Mn alloys. The scope of this work was to employ chloride electrolyte, in electrodeposition of Zn-Mn alloys with optimal Mn content on one side, and satisfactory surface appearance and morphology on the another side. The influence of deposition current density and manganese concentration in the electrolyte was investigated. The electrochemical reactions of interest were investigated by cyclic voltammetry and chronoamperommetry. The samples obtained were characterized by scanning electron microscopy and energy dispersive X-ray spectrometry.

V/4

Research on local corrosion processes in low-alloyed pipeline steel

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The main problem pipeline rupture can be defined as corrosion damage local tube parts. Therefore it is important to recognize the effects of structure and nonmetallic inclusions on corrosion resistance and particularly on pitting corrosion processes. The alloy used in this study had a composition of 0.15C, 0.50Mn, 0.25Si, 0.52Cr, 0.20Cu, 0.13Ni, 0.05V. Optical metallography, electron microscopy and potentiodynamic polarization methods are widely known as very powerful methods to research microstructure and points of pitting formation. It was found the basic classes of inclusions, their influence on pitting corrosion and dependence corrosion damage from microstructure.

V/5

ADI - an advanced engineering material

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ADI (Austempered Ductile Iron) is an advanced material used in automotive industry and modern engineering. It posses remarkable mechanical properties along with lower weight and production cost. ADI is a heat treated ductile iron, austenitisated and isothermally transformed in order to produce unique microstructure- ausferrite. To achieve desired properties of ADI it is necessary to determine the optimal austempering parameters. Therefore, in this paper, microstructure and mechanical properties of unalloyed and differently austempered ADI material were studied. It was found that ductility is highest when austempering is done at 400°C for 1h, while strength and hardness are highest at 300°C.

V/6

Mössbauer analysis of the cold plastic deformation rate effect on intermetallics dissolution in Fe-Ni alloys

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Deformation rate as a critical parameter of the process of anomalously low-temperature deformation-induced diffusion in metals is investigated for high rates $\acute{\varepsilon} = 10^2 \ldots 10^3\ c^{-1}$, for example, at impact or impulse action. It is supposed, that in such cases the tension in structure reaches such magnitudes which promotes the generation of interstitial positions that take part in low-temperature nuclear mass transfer.

It was established that at low rates $\acute{\varepsilon}$ in the interval $10^{-2} \ldots 10^{-1}\ c^{-1}$, but at larger degrees $\varepsilon = 4 \ldots 7$ of deformative influence under compression shear in Bridgman anvils the increase of rotation rate in anvils from 0.3 to 1 rpm leads to large (about 30%) intensification of dissolution of intermetallic particles Ni_3Me (Me = Ti, Al, Zr, Si) in matrix of FCC Fe-Ni alloys. The method of Mossbauer spectroscopy was used to determine the dissolution kinetics by the growth of effective magnetic field on nuclei ^{57}Fe as a result of growth of nickel content in matrix at intermetallics dissolution.

The kinetic curves of dissolution of particles with different morphology, sizes, crystal lattice type, bonding forces and diffusion atom mobility were obtained. The rate influence is mostly exhibited on the steep part of kinetic dependence of ΔC_{Ni} on ε, when the rotation mode of deformation dominates.

It is specified, that kinetics of deformation-induced nonequilibrium phase transitions is controlled by the competitive development of alternative processes of phase dissolution and extraction [1,2]. The increase of slope angle of kinetic dissolution curves happens mainly because of the influence time shortening of alternative process of intermetallics extraction over vacancy mechanism, and apparently because of the concentration growth of interstitial atoms which take part in the nonequilibrium dissolution of intermetallics. Besides, it is shown that the increase of deformation rate is accompanied by reduction of deformation incubation period ε_0, necessary for the preliminary particles splitting.

The obtained results have practical importance for the development of steels and alloys strengthened with nanodimensional particles with the use of mechanical activation.

V/7

Utilization of Pb– metallurgical waste

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The aim of this paper was a laboratory verification of flotation and leaching a sample of waste Pb-slag, sampled at the tailings dump of the plant Kovohute Pribram, a.s. Using the flotation and leaching with waste Pb-slag samples from Kovohute Pribram, a.s., the most optimum method to extract Pb from slag appears to be the leaching with inorganic acids - HNO_3 or HCl. Suitable concentrations permitted a near 99 % Pb recovery into the leachate.

VI/1

Determination of glucose using polyaniline modified electrode

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Sensor electrode was formed by immobilization of glucose oxidase (GOx) on polyaniline (PANI), electrochemically synthesized on graphite electrode from aqueous hydrochloride acid electrolyte containing aniline monomer by galvanostatic method. Optimization of the current density used for the synthesis of PANI was performed. Immobilization of GOx was achieved by crosslinking via glutaraldehyde and the efficiency of the immobilization was determined spectrophotometrically. Using chronoamperometric curves of glucose oxidation on polyaniline apparent Michaelis constant was estimated to be 0.273 mM. The storage stability of the enzyme electrode was examined for twenty days, after which it retained 84% of its initial signal.

VI/2

Oxygen reduction on polycrystalline Au modified by nanosized Pd islands

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Oxygen reduction reaction was studied on polycrystalline gold, Au(poly), modified by nanosized palladium islands. Linear sweep voltammetry measurements were performed using rotating Au-disk electrode in oxygen saturated 0.05 M H_2SO_4 solution. Morphology of obtained Pd/Au(poly) electrodes was characterized by tapping-mode atomic force microscopy, after each deposition from Pd containing solution. Only homogeneous distribution of deposited Pd islands nonuniform in size is observed. Active surface area of the deposited Pd was estimated from cyclic voltammetry profiles. Obtained Pd/Au(poly) surfaces have shown a significant catalytic activity towards oxygen reduction reaction which increases with the increase of the active surface area.

VI/3

Electrochemistry and spectroscopy of an energetic material FOX-7 – A molecular approach to degradation mechanism

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A new energetic material 2,2-dinitroethene-1,1-diamine (FOX-7) has significant potential for application due to its high detonation energy and velocity and simultaneously low sensitivity. Generally, explosion is based on thermally initiated chain of intramolecular redox reactions. Recently it has been found that electrochemical reduction in aqueous and also in non-aqueous solutions is also able to provoke the chain of follow-up processes leading to total decomposition of the parent substance. DC-polarography with coulometry proved to be useful in elucidation of redox properties of FOX-7. For detection of radical intermediates the in situ UV-VIS and ESR spectroelectrochemical approach was used.

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VI/4

Adsorptive stripping voltammetric determination of trace levels of doxorubicin in selected real samples

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Doxorubicin is a widely used anticancer drug. Its voltammetric properties have been investigated by using various carbon based electrodes either by measuring doxorubicin directly or by measuring its metabolites in pharmaceutical/biological samples, with a detection limit reaching picomolar concentrations.

In this research we used glassy carbon electrode as a working electrode for adsorptive stripping voltammetric determination of doxorubicin, as it strongly and irreversibly chemisorbs on the electrode surface. In real samples with 0.1 mol/dm^3 acetate buffer solution pH 4.75, in the potential range 0.0 - 0.8 V (vs. SCE), one well-defined oxidation peak around 0.5 V was observed. We confirmed the possibility of doxorubicin determination at low ppb concentration level in real samples such as river Tisa sample and human urine sample.

VI/5

Oxidation of hydroxide ions at platinum modified zeolite electrode

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NaX zeolite was modified by platinum via impregnation/thermal decomposition technique, using Pt(II)-acetylacetonate in acetone as an impregnating solution. The samples were characterized by scanning electron microscopy. The mixture of modified zeolite and 10 wt. % of carbon black, in a form of thin layer, was pasted to a glassy carbon surface by nafion. The hydroxide ion oxidation was studied on this electrode by cyclic voltammetry. The response of modified zeolite electrodes was compared with platinum electrode, bare and covered with nafion film. The presence of nafion improved reproducibility of both covered platinum electrode and platinum modifed zeolite electrode.

VII/1

Preparation of Si-Ge nanostructured thermoelectic materials by mechanical alloying

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It has been recognized recently that the bulk nanostructuring approach provides a route for the reliable improvement in the performance of thermoelectric materials. It has been reported recently that marked improvement of thermoelectric properties of Si-Ge can be achieved by mechanical alloying. However, reported in the papers technical details of the ball-milling process are often cursory. Here we report on the evolution of structural properties of *n*-type Si-Ge thermoelectric materials during ball-milling.

We show that Si-Ge nanostructured materials can be prepared by mechanical alloying of the raw ingredients for 6 h at a milling speed of 350 rpm.

VII/2

Developing of cobalt and corundum nanopowders for bond application at diamond tool manufacturing

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The purpose of given research was analysis of availability of using nanodispersed materials as bonds at diamond tools manufacturing.

The methods of thermogravimetry, X-ray diffraction, electron microscopy, infrared spectroscopy, low temperature adsorption were used in the research.

The conditions of obtaining nanosized hydrophobic phase – corundum with particle size less than 50 nm and nanosized cobalt powder with controlled dispersion in the range 100-20 nm were developed. The effect of the introduction of corundum nanopowder to bonds of diamond tools improving hardness and abrasion resistance was found. The improving of sintering bonds and the increasing of bonds hardness were observed in case using of nanosized cobalt ligaments.

VII/3

A method for obtaining nanosized molybdenum powders from petrochemical industry wastes

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The aim of the presented work was to develop a method for producing molybdenum and molybdenum trioxide nanopowders from spent hydrodesulphurization catalysts. The raw material, intermediate and final products was investigated by thermogravimetry, secondary ion mass spectrometry, scanning electron microscope, and X-ray analysis.

According to the developed method, molybdenum, molybdenum trioxide and alumina nanopowders were obtained with specified morphology and dispersion. Output of molybdenum was more than 80 %. According to the X-ray analysis, in the final products wasn't found no impurity phases.

A character of the temperature dependence of molybdenum nanopowder specific surface area was shown.

VII/4

Photocatalytic efficiency of TiO_2 nanopowders prepared by sol-gel route in degradation of metoprolol in water suspension

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Nanocrystalline titanium dioxide (TiO_2) powders have been synthesized by sol-gel method using titanium tetrachloride ($TiCl_4$) or tetrabutyl titanate ($Ti(OC_4H_9)_4$ as precursors, different alcohols and calcination temperatures in the range from 400 to 650^oC. Synthesized powders were tested for their photocatalytic activity in the degradation of metoprolol, a selective β-blocker used to treat a variety of cardiovascular diseases, and compared to photocatalytic activity of Degussa P25. Nanosized TiO_2 powders prepared from $TiCl_4$ and amyl-alcohol, calcinated at 550^oC, displayed an activity comparable to Degussa P25, whereas the sample from the same series, calcinated at 650^oC, showed a higher photocatalytic activity in the whole range of the catalyst loading.

VII/5

Aerosol-assisted low-temperature processing of colloidal TiO_2 nanoparticles: two different manners for improving the optical properties

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In order to preserve unique properties of TiO_2 nanoparticles towards their surface modification, two different approaches of low temperature aerosol-assisted processing were performed. Both were based on colloid precursor atomization and subsequent spray drying at T=150 ^oC in a hot wall reactor. In the first case, pure TiO_2 colloid precursor solution was atomized and produced submicronic particles are subsequently modified, while in the second one atomization of already modified colloid precursor solution were done. In both cases the TiO_2 surface modification was achieved with 30 % of dopamine. Powders crystallinity and phase composition were studied by X-ray powder difraction (XRPD), while detailed powders morphological characterization was followed using scanning and transmission electron microscopy (SEM and TEM). Optical properties of the surface modified TiO_2 particles were investigated using reflection spectroscopy while the binding structure between dopamine and the surface titanium atoms was investigated by FTIR spectroscopy.

VII/6

Goethite nanoparticles synthesized with addition of various surface active substances

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To receive monosized goethite (α-FeOOH) nanoparticles in the process of chemical precipitation from iron salt and alkali various surface active substances (SAS) were added in water: $C_{12}H_{25}NaO_4S$ (SDS), $C_{12}H_{38}ClN$ (CPC) and EDTA $C_{10}H_{14}O_8N_2Na_2$ (complexon). Investigations by means of TEM and Mossbauer spectroscopy show, that addition of CPC increases the amount of small particles with sizes of 2-5 nm in comparison to goethite nanoparticles, obtained without SAS. However in case of SDS and EDTA the growth of well-crystallized goethite particles with sizes of about 100*20nm takes place.

Thermomagnetic analysis revealed unusual behaviour: in the temperature region of 200-500^oC peaks of magnetization are occurred. These peaks can be explained by transformations of various organic Fe^{3+}- complexes, formed on the nanoparticles surface, under SAS influence to magnetic phases.

VII/7

Surface plasmon resonance of Ag organosols: Experimental and theoretical investigations

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Silver nanoparticles (Ag NP), 5 ± 1.5 nm in diameter, were prepared in water by reduction of the silver nitrate with sodium borohydride and transferred into different organic solvents using oleylamine as a transfer agent. The UV-Vis absorption spectra of obtained Ag organosols showed changes in position of surface plasmon resonance band depending on used solvent. To analyze these changes, absorption spectra were modelled using Mie theory for small spherical particles. The experimental and theoretical resonance values were compared to those predicted by Drude model and its limitations in the analysis of absorption behaviour of Ag NP in organic solvents are briefly discussed.

VII/8

Features of the nanostructured materials based on the quantum dots

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Last decade the nanostructured materials have been used in many areas of scientific and practical applications. That is why a search for their new properties is very important task.

The aim of present work is to study the dynamic and photoconductive properties of liquid crystal (LC) mesophase and polyimide matrices sensitized by *CdSe/ZnS* quantum dots. For this purpose the LC elements speed and change in the some physical parameter such as charge carrier mobility have been investigated. The results could be interesting both for the fundamental researches and for practical applications.

The work has been supported by RFBR grant #10-03-00916.

VII/9

Removal of Copper from Aqueous Solutions using a fluidized bed reactor

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A fluidized bed reactor (FBR) has been investigated for removal of Cu(II) from aqueous solutions using two types of zeolites: natural clinoptilolite and synthetic zeolite A. Firstly, the fluidized beds were characterized regarding hydrodynamic properties to define optimal operating regimes and then sorption kinetics were examined. The FBR is efficient for both types of zeolites. Sorption kinetics depends on the used zeolites. Lagergren pseudo-second-order model best describes the Cu(II) sorption by natural clinoptilolite and the diffusion model represents the Cu(II) removal by synthetic zeolite A. The study indicates that the FBR could be used in waste-water treatment.

VIII/1

Phase relations in the Nb_2SbVO_{10}–Sb_2O_4 system in the solid state

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The aim of this work was determining the phase relation in the Nb_2SbVO_{10}-α-Sb_2O_4 system over the whole component concentration range. The samples for the studies were prepared in high temperature reaction of V_2O_5 and α-Sb_2O_4 with T-Nb_2O_5. The titled system has been investigated by using XRD, DTA, IR and SEM methods. XRD phase analysis of the samples after the last heating stage has shown, among them, that in the solid state Nb_2SbVO_{10} and α-Sb_2O_4 are not inert to one another but interact to form a new compound. The diagram of the Nb_2SbVO_{10}-α-Sb_2O_4 system up to solidus line has been constructed.

VIII/2

Optimization of technology of thermoelectric materials based on Bi_2Te_3

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Nowadays, the most efficient thermoelectric materials in a temperature range 50-200^{o}C are solid solutions of the bismuth and antimony chalcogenides. Failure of thermoelectric generator modules due to irreversible changes in the contact layer has sometimes been detected at a temperature of 170 ^{o}C.

Here we analyze reasons of the destruction of *n*-type thermoelements responsible for the failure of the modules. It was found that, at $T \geq 170^o$C, surface diffusion of bismuth results in the formation of BiSn eutectic with a low melting temperature, which penetrates the material at the damaged layer formed during electroerosion cutting.

VIII/3

Building products based on fly ash

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The purpose of this study was to test utilization possibilities of fly ash as raw material for building products. Research was done on samples made of landfill fly ash by dry pressing process. The samples were subjected to ceramic-technological tests, and analytical techniques used are SEM, XRD, DTA/TGA, along with heavy metal leaching experiments**.** The SEM images show that the material is composed of numerous small grains and pores, imbued with channels. Raw material contains toxic metals, but the leachability of metals after samples firing reduces to a negligible level. Compressive strength increases significantly with firing temperature.

VIII/4

Photoacoustic response of thin films – thermal memory influence

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On the basis of the generalized photoacoustic response model, which includes the influence of thermal memory on both thermoconducting and thermoelastic component, photoacoustic response of thin films is analysed. It is demonstrated that the influence of thermal memory is manifested at frequencies above certain boundary frequency, which depends on thermal memory properties of the sample and its width. A linear relation, linking heat propagation velocity and measured signal, is derived. Taking into account the confinement of the frequency range imposed by the measuring system, it is indicated that thermal memory properties of non-cristaline thin films can be determined in a photoacoustic experiment.

VIII/5

Study of the electrothermal switching effect in bulk glassy semiconductor $Cu_{15}(AsSe_{1.4}I_{0.2})_{85}$

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The static and dynamic current-voltage characteristics of the bulk chalcogenide glassy semiconductor $Cu_{15}(AsSe_{1.4}I_{0.2})_{85}$ have been measured in the temperature range 303-373 K. They exhibit a transition from an ohmic behaviour in the lower-field region to a non-ohmic behaviour in the high-field preswitching region. It has found that this glass exhibits a current-controlled negative resistance switching characteristic with memory. The electrical resistance obeys an Arrhenius type dependence with single activation energy. The threshold voltage decreases exponentially with increasing temperature. The switching phenomenon in the investigated glassy semiconductor can be explained according to a physical model based on the electrothermal breakdown theory.

VIII/6

Atomic force microscopy and UV-VIS spectroscopy characterization of carbon quantum dots

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New method for Carbon Quantum Dots (CQD) synthesis is presented in this paper. Method used for CQD synthesis was electrophoresis. CQD were characterized by Atomic Force Microscopy (AFM) and UV-Vis spectroscopy. It was found out that size of CQD depends on the current intensity used in electrophoresis during the synthesis. Size of particles can vary from 30nm – 200nm. Also, it was discovered that position of the absorption lines in UV-Vis spectroscopy depended on size of CQDs. This new carbon nano-material has many similarities with fullerenes. Compared to fullerenes, CQDs are easier and less expensive to produce. This can lead to utilization of CQDs instead of fullerenes in various applications where latter have proved to have unique properties, such as solar cells and biomedical applications.

VIII/7

Thin transparent conductive graphene films with PVP

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Thin transparent conductive films were made on glass slides from chemically exfoliated graphene using vacuum filtration technology. Polyvinylpyrolidone was used as a surfactant for obtaining aqueous solutions of individual graphene sheets in the exfoliation process through ultrasonication. Optical and structural characteristics of the films were studied with different microscopy and spectroscopy methods and they proved to be conductive and transparent up to 95%. Films were further gamma irradiated in attempt to improve their electrical properties. Irradiation improved the conductivity and quality of the films by reducing contact resistance between graphene sheets.

IX/1

Z-scan measurement of nonlinear optical properties

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This paper presents measurement of nonlinear optical properties of materials by using single beam z-scan technique. Theoretical explanation of the technique and experimental results are given. As a light source continuous wave green laser at 532 nm is used. The sample of a material is moved along z-axis in range of 15 cm experiencing different levels of irradiance. This technique is based on separate measurements of light transmission and absorption through material, with and without aperture, respectively. The results are fitted by using LabVIEW software in order to obtain nonlinear refractive index and nonlinear absorption coefficient of the investigated material.

IX/2

Pelletized fly ash – a new aggregate for lightweight concrete

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This work presents detailed characterization of fly ash from the Nikola Tesla Steam Power Plant B, Obrenovac, Serbia, and the ash pelletization process using Portland cement and bentonite clay binders in 5 ÷ 35 percent proportions. Each pellet-size fractions is tested on the compressive strength, impact strength, attrition and other mechanical properties. Pellets produced using bentonite are calcified and sintered at the temperature of 1100ºC. Finally, the recommended applications of palletized fly ash are the aggregate for lightweight concrete in the building-materials industry, in agriculture, for soil stabilization in landfills, or in landscaping.

IX/3

Synthesis and some properties of new ternary oxide in the V_2O_5-NiO-In_2O_3 system

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A studies on three-component systems of metal oxides, aimed among others at searching for new phases formed in such systems, establishing conditions for their synthesis and determining properties have gained crucial importance for designing of novel catalysts which can find application in processes of oxidation of hydrocarbons. Study of the V_2O_5-NiO-In_2O_3 system by XRD, DTA and SEM methods has proved that a hitherto unknown compound Ni_2InVO_6 occurs in the system.

Obtained results have allowed us to divide investigated system V_2O_5-NiO-In_2O_3 into seven subsidiary subsystems and to determine temperatures and components concentration range in which Ni_2InVO_6 remains at equilibrium in solid state with other phases formed in corresponding binary systems.

IX/4

Alloy characterization of ternary Ni-Pb-Sb system

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This ternary Ni–Pb–Sb system has a widely used in industry. For the complete definition of the properties of the ternary Ni–Pb–Sb system, were characterized by microstructural SEM–EDS and optical microscopy analysis, Brinell hardness tests and electrical conductivity measurements of the alloys. Based on obtained experimental results for alloys from two vertical sections, isolines of hardness and electrical conductivity for ternary Ni–Pb–Sb system were calculated. By application of CALPHAD method there were calculated the isothermal cross section at 25°C. The phases on calculated cross sections were found to be in a good agreement with experimentally determined phase compositions in analyzed microstructures.

IX/5

Characterisation of bronze surface coatings on titanium formed by plasma electrolytic oxidation in 12-tungstosilicic acid

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The growth of silicate tungsten bronzes on titanium by plasma electrolytic oxidation (PEO) in 12-tungstosilicic acid was experimentally investigated. Oxide coatings were characterized by AFM, SEM-EDS and XRD. It was confirmed that oxide coating morphology is strongly dependent on PEO time, density of discharge channels decreases while their diameter increases resulting in increased roughness of oxide coatings. The elemental components of PEO coatings are Ti, W and O. Oxide coatings are partly crystallized and mainly composed of WO_3 and TiO_2. Raman spectroscopy showed that the outer layer of oxide coatings is silicate tungsten bronzes.

IX/6

Influence of thermal treatment on structural, morphological and optical characteristics of upconvertors

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The upconverting phosphors are materials of great interest for optoelectronics operating in the near infrared region. The preparation of highly spherical Y_2O_3:Yb,Er particles are synthesized *via* spray pyrolysis from common nitrate solution with fixed dopants ratio of Yb/Er=10. The processing conditions are as follows: precursor concentration 0.1M, atomization frequency 1.3 MHz, temperature regime 200-900-900°C and air flow rate 1,6 dm^3/min. The as-prepared particles collected in the electrostatic precipitator are additionally thermally treated at 1100 °C for 12, 24 and 48 hours. Detailed structural analyses are performed by X-ray powder diffraction (XRPD) based on which the structural refinement is done using Topas Academic Software. The results imply that with the increase of calcination time crystallite size increasing along with microstrain diminishing. The particle morphological characteristics are studied by scanning electron microscopy (SEM) and are further correlated with specific surface area (BET), size distribution (LPS) and optical properties followed through photoluminescence measurements (PL).

IX/7

Raman spectroscopy of gamma irradiated single wall carbon nanotubes

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In this paper we present the effects of different dose and media of gamma irradiation on the Raman spectra of metallic and semiconducting single wall carbon nanotubes (SWCNTs). SWCNTs were subjected to doses of 25, 50 and 100 kGy in air, aqua ammonia and deionized water. Raman spectra of all gamma irradiated SWCNTs were measured using two lasers, 532 and 780 nm wavelengths. Results showed the structural disorder of SWCNTs increases with irradiation dose. The most efficient debundling of SWCNTs was in the sample of SWCNTs irradiated in aqua ammonia with 50 kGy.

IX/8

Electrospun PVB-SiO_2 composite fibers: morphology, properties and ballistic applications

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This research examined the PVB-SiO_2 composite micro- and nanofibers produced by the electrospinning process. The experiments were carried out with the 10 wt.% PVB ethanol solution. The silica nanoparticles, both modified and unmodified with AMEO silane, were added into the solution in different contents of 1, 3 and 5 wt.% SiO_2. For ballistic purposes, the unmodified silica nanoparticles were put into the same solution with concentration of 50 wt.% SiO_2. The aramid fabrics were coated with this solution and the produced PVB-SiO_2 fibers were deposited on them. The structures and properties of the PVB-SiO_2 composite fibers and aramid fabrics were investigated by SEM microscopy, FTIR and DSC analysis.

X/1

Investigating nanoporous silica aerogel obtained through negative pressure rupturing - A molecular dynamics study

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The objective of this study was to use classical molecular dynamics to simulate the nanopores of silica aerogel. The potential was the van Beest, Kramer and van Santen (BKS) potential, widely used to model amorphous silica, together with an additional 24-6 Lennard Jones term to ensure atomic cohesion at high temperatures. The aerogel samples were obtained through negative pressure rupturing. By instantaneous stretching of all bond lengths in amorphous silica in a stepwise manner, the fractal nature of nanoporous silica aerogel could be reproduced. These samples can possibly be used for further molecular dynamics studies of aerogel's properties, including its thermal properties.

X/2

Comparative analysis of different methods for graphene nanoribbon synthesis

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Graphene nanoribbons (GNRs) are thin strips of graphene that have captured the interest of scientists due to their unique structure and promising applications in electronics. This paper presents the results of a comparative analysis of morphological properties of GNRs synthesized by different methods. We propose a new highly efficient method for GNR production by gamma irradiation of graphene dispersed in cyclopenthanone. Surface morphology of GNRs was visualized with atomic force and transmission electron microscopy. Results of photoluminescence spectroscopy revealed for the first time that synthesized nanoribbons showed photoluminescence in the blue region of visible light in contrast to GNRs synthesized by other methods.

X/3

Complex impedance spectroscopy of Ti doped α–Fe_2O_3

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Iron oxide semiconductors are a good choice for direct water splitting under solar lighting on account of their band gap, stability in solution and ease of production and accessibility. In this study, the impedance characteristics of hematite α–Fe_2O_3 doped with TiO_2 (5 and 10 wt.% TiO_2) were investigated by the impedance spectroscopy method in the temperature range 323K – 423 K and the frequency range 100 Hz – 1 MHz. Measurements were carried out with a HP–4194A impedance/gain-phase analyser using a HP–16047A test fixture. The real and imaginary parts of the complex impedance change with frequency. Both decrease with increasing temperature at lower frequencies and are merged at higher frequencies. Impedance analysis was performed using the equivalent circuit model $R_1+R_2||C_2$ and it suggests a single relaxation process in the pellet at a particular temperature. The dielectrical relaxation mechanism of sintered samples was analyzed by the Cole–Cole plots. The Cole–Cole plots under various temperatures exhibit one relaxation mechanism. With increasing temperature, the radius of the Cole–Cole plots decreases, which suggests a mechanism temperature–dependent on relaxation.

X/4

Frequency up-converter for silicon solar cells based on multiple quantum wells realized in nonpolar a-plane GaN/AlGaN

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We present a procedure for structural parameters optimization of multiple quantum well (QW) based up-converter for silicon solar cells (SC). It relies on systematic tuning of individual QWs via the generic algorithm. By utilizing nonlinear optical effects, based on intersubband transitions, a couple of low-energy photons is transformed into a high-energy photon that can be absorbed by the SC. The up-converter comprises a sequence of about fifty GaN/AlGaN QWs optimized for conversion of photons with different wavelengths. This particular combination of semiconductor materials provides for a large enough conduction band offset to accommodate three bound states with sufficient energy spacing.

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X/5

Assessment of safety valve springs failure

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The aim was to investigate the cause of failure of as-received ultra-high strength steel springs, which were deposite-coated. The qualitative analysis of surrounding environment was performed. Springs were visually and radiographically examined. Their chemical composition was determined using spectrophotometer, primary and secondary structure by use of bright-field reflected light microscope with vertical illumination source, and fracture mechanism by scanning electron microscope with energy dispersive system. Macro-hardness measurements were employed, also. The phases present in deposite were identified using X-ray Powder Difractometry and Electron Microprobe analysis. The safety valve springs failure is caused probably by corrosion-assisted process with presence of overloading.

X/6

Technology of obtaining alloy powder CoCrAlYSi

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The aim of this paper is obtaining alloy powder Co-Cr(20 – 30 % mass.)- (8 – 14 % mass.)Al-(0,5 – 1,8 % mass.)Y-(2 – 4 % mass.)Si. Alloy powder was been obtained by duplex technology. The first stage process consists in electron-beam melting clean charge materials in ingot. On the second stage process this ingots crushing on the rolling mill to the powder of the fraction 40 – 100 μm. Bulk weight of the obtaining alloy powder (40 – 100 μm) consist from 2,7 to 3,35 g/cm^3.

Surface morphology was been studied of the obtaining alloy powder of the scanning microscopy method. Powder particle has polyhedral form. Some of them has little crack. Surface of powder particles are sufficiently develop.

Chemical composition of the powder was obtained in different region of the powder, by the assist dispersion analyzer. The content of the oxygen in powder is 0,08 % mass., what less then in powder obtained by another methods obtaining powder, such as, atomization.

X/7

Comparison of structural modifications of SWCNT thin films treated by laser and thermal irradiation

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In present work we compare the effects of OPO laser and heat irradiation upon thin films of single wall carbon nanotubes (SWCNTs). Modification of carbon nanotube structure was analyzed both by Raman spectroscopy and atomic force microscopy. Results showed that OPO laser irradiation affects both metallic and semiconducting nanotubes, with the most ascendant effects at 430 nm wavelength. On the other side, heat irradiation more affects metallic nanotubes, while semiconducting SWCNTs are more resistant upon it. Decreasing of D band in Raman spectra of SWCNTs heated in air indicates prominent oxidation of carbon impurities, therefore this method can be applied for routine removal of those impurities.

XI/1

Swelling and biocompatibility behavior of P(HEA/IA/PEGDMA) Hydrogels

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Novel types of hydrogels based on 2-hydroxyethyl acrylate (HEA), itaconic acid (IA), and different types of poly(ethylene glycol) dimethacrylates (PEGDMA), were prepared by free radical crosslinking copolymerization. Equilibrium swelling, network parameters, and biocompatibility of the P(HEA/IA/PEGDMA) hydrogels were investigated as a function of different types and molar fractions of PEGDMA. Swelling studies were conducted in the range of physiological pH and temperature values, interesting for biomedical applications. All hydrogels show a noticeable pH–responsive and temperature dependent swelling behaviour, and can be considered smart hydrogels. Calculated network parameters indicated micro- to macroporous pore size regime of P(HEA/IA/PEGDMA) hydrogels. Biocompatibility testing of obtained hydrogels, performed by hemolytic activity assays, showed good compatibility with blood. The results of swelling and biocompatibility tests for P(HEA/IA/PEGDMA) hydrogels indicate their good potential for a wide variety of biomedical applications.

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XI/2

Thermoresponsive silver/poly(N-isopropylacrylamide) hydrogel Nanocomposites synthesized by gamma irradiation

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This work describes synthesis of silver nanoparticles (AgNPs) within thermoresponsive poly (N-isopropylacrylamide) (PNiPAAm) hydrogels. PNiPAAm hydrogel was previously obtained by gamma irradiation induced simultaneously polymerization and crosslinking. Characteristics of polymer network (pure and nanocomposites) and their morphology were investigated by swelling measurement under the different condition as well as by SEM analysis. The formation of AgNPs was confirmed by appearance of typical surface plasmon absorption band, with peak maxima around 400 nm. The size, size distribution and morphology of AgNPs were investigated by TEM analysis and compared with results obtained by Mie theory. Interaction between AgNPs and polymer network was investigated by FTIR spectroscopy, while the silver release from hydrogel nanocomposites was determined by ICP measurement.

XI/3

Chitosan/poly(vinyl alcohol) blend as a capping agent for gamma irradiation induced *in situ* synthesis of silver nanoparticles

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The materials with metal nanoparticles incorporated into polymer matrix have been widely investigated due to their unique properties. Polymeric mixtures have proved as excellent capping agent for inhibition of particle growth. This work describes gamma irradiation induced *in situ* synthesis of silver nanoparticles (Ag NPs) in chitosan/poly(vinyl alcohol) (Ch/PVA) blend as a capping agent. The absorption spectra of Ag colloids show typical plasmon band of Ag NPs around 410 nm, which corresponds to NPs of about 15 nm in diameter (estimated by Mie theory). Structural analysis of Ag-Ch/PVA nanocomposites (XRD and FTIR) indicate the formation of Ag NPs with face centered cubic structure, stabilized by interaction between the surface of NPs and polymeric chains.

XI/4

Adsorption kinetics of Bezactiv Orange V-3R dye on chitosan/montmorillonite membranes

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The adsorption kinetics of Bezactiv Orange V-3R, an azo-dye used in textile industry, on chitosan/montmorillonite membranes was investigated. The adsorption kinetics was investigated at three different concentrations of Bezactiv Orange dye - 30, 50 and 80 ppm. The results showed that the optimum condition for adsorption of Bezactiv Orange was at pH=6, and that the weight of adsorbent had no significant influence on the adsorption capacity.

A comparison of four kinetic models, and three adsorption isotherms were applied to experimental equilibrium data. The results indicate a pseudo-second order kinetic model, followed by intra-particle diffusion is the best fitting model.

XI/5

ESR/UV-VIS-NIR spectroelectrochemical study of the charging the SWCNT/oligothiophene interphase

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This study was focused on the spectroelectrochemical investigation of the effect of SWCNT (Single-Walled Carbon Nanotubes) on the charging of oligothiophenes. Interactions between charged oligothiophenes and carbon nanotubes were studied by cyclic voltammetry as well as the in situ ESR/UV-VIS/NIR spectroelectrochemistry to get detailed information on the formation of both paramagnetic and diamagnetic states. By the interaction of the charged oligothiophenes with SWCNT, the π-dimerization and the formation of multi π-stacks structures were occurred.

XI/6

Synthesis of polyaniline by dopant-free interfacial polymerization of aniline

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Polyaniline is one of the most extensively studied conducting polymers because of its simple synthesis, reversible doping/dedoping chemistry, low cost, high conductivity and various applications. In this work, polyaniline was synthesized by the oxidation of aniline with ammonium peroxydisulfate in an immiscible organic/aqueous biphasic system, without added acid. An organic phase contained aniline dissolved in chloroform, while the oxidant was dissolved in water. The produced polyaniline had a conductivity of the order of 10^{-2} S cm^{-1}. Its nanogranular morphology was revealed by SEM measurements. Molecular structure of synthesized polyaniline was investigated by FTIR, Raman and UV-Vis spectroscopies. The differences in the molecular structure and properties of polyanilines prepared by dopant-free interfacial polymerization and corresponding reaction in monophasic aqueous system are discussed.

XI/7

Tetrabutylamoniumbibenzoate catalyzed group transfer copolymerization of tert-butyl methacrylate

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Although it was reported that the group transfer polymerization of tert-butyl methacrylate (tBMA) in the presence of Tetrabutylamoniumbibenzoate (TBABB) is not possible, the copolymer was obtained in the presence of 2-(methoxyethoxy)ethyl methacrylate (DEGMA). Therefore, statistical polymerization of DEGMA and tBMA was performed using the TBABB as a catalyst and methyl trimethylsilyl dimethylketene acetal (MTS) as the initiator. The results were evaluated by the Kelen-Tudos method, and the composition was determined by the NMR measurements. The copolymerization parameters of this system were determined as r_{tBMA}=0.054 and r_{DEGMA}=0.73. Those values corroborated presumption that the copolymerization parameter of the tBMA is low.

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XI/8

Investigation of reaction kinetics of polyurethane preparation based on vegetable oil

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Castor oil is a triglyceride (ester) of fatty acids, and approximately 90% of the fatty acid content is ricinoleic acid. Due to the existence of hydroxyl groups, the oil is suitable for reactions with isocyanate compounds and polyurethane materials preparation. The objectives in this work were investigation of curing kinetics by differential scanning calorimetry (DSC) and application of Ozawa isoconversional method for calculation of kinetic parameters and to analyse how they are influenced by the different types of isocyanates (aromatic, cycloaliphatic, aliphatic and polyisocyante). NCO/OH ratios, r, was 1 for all experiments. Fourier transform infrared spectroscopy (FTIR) was used to follow major curing reactions.

XI/9

Influence of kaolinite microstructure on its adsorption capacity for Cu(II)

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The properties of metakaolin-based geopolymer are influenced by the microstructure and composition of initial kaolinite, composition and relative amount of alkali activator used as well as the conditions during the initial period geopolymerization reaction. This study investigated the effect of microstructural changes caused by synthesis on adsorption properties of geopolymer samples. The microstructure of samples has been characterized by X-ray diffraction and scanning electron microscopy. The degree of metal adsorption was evaluated analyzing the Cu(II) contaminated samples by using AAS (Aanalyst 700/Perkin-Elmer). The results show the high degree impact of immobilization efficiency and microstructure on immobilization efficiency.

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