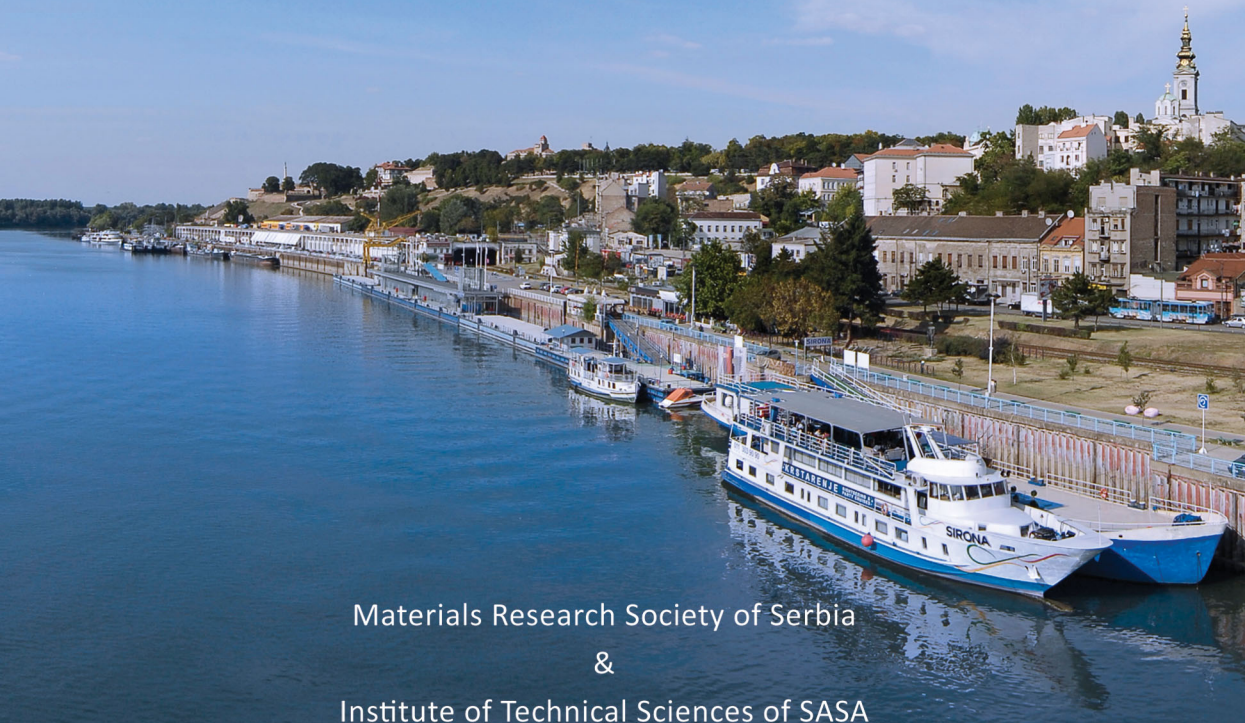
THIRTEENTH YOUNG RESEARCHERS' CONFERENCE
MATERIALS SCIENCE AND ENGINEERING

December 10-12, 2014, Belgrade, Serbia

Serbian Academy of Sciences and Arts, Knez Mihailova 36

PROGRAMME & THE BOOK OF ABSTRACTS



Materials Research Society of Serbia

&

Institute of Technical Sciences of SASA

December 2014, Belgrade, Serbia

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Program and the Book of Abstracts

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Institute of Technical Sciences of SASA

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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

New synthesis and processing methods
Materials for high-technology applications
Theoretical modelling of materials
Nanostructured materials
Biomaterials

Scientific and Organizing Committee

Conference Secretary
Aleksandra Stojičić Institute of Technical Sciences of SASA, Belgrade, Serbia

Conference Technical Committee

Milica Ševkušić, Zoran Stojanović, Miodrag Lukić, Ana Stanković, Maja Kuzmanović, Nenad Filipović, Miloš Milović, Ljiljana Veselinović

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 journals "Tehnika – Novi Materijali" and "Processing and Application of Ceramics". The best presented papers, suggested by Session Chairpersons and selected by Awards Committee, will be proclaimed at the Closing Ceremony.

Sponsors

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Meet the recipients of 12YRC 2013 awards

Jovana Zvicer, PhD student at Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia**,** presented "Cytotoxicity of Ag/alginate nanocomposites: *in vitro* and *in vivo* studies", by Jovana Zvicer, Lenart Girandon, Urška Potočar, Mirjam Fröhlich, Ivan Jančić, Biljana Bufan, Marina Milenković, Jasmina Stojkovska, Vesna Mišković-Stanković, Bojana Obradović. Ms. Zvicer finished academic and master studies and in 2011 enrolled PhD studies and began her research career at the Faculty of Technology and Metallurgy, University of Belgrade. During recent years she has participating in various national and international projects, including Eureka and Cost Action projects. She presented result of her studies in many conferences, including 9YRC 2010, TERMIS 2012, NanoBelgrade 2013, 12YRC 2013, TERMIS 2014, YUCOMAT 2014. Her major fields of interests are tissue engineering, bioreactor cultivations, cytotoxicity studies in different systems and development of novel biomaterials.

Dr. Marko V. Lubarda, assistant professor at the Faculty of Polytechnics, University of Donja Gorica, Podgorica, Montenegro, presented "Advanced computational methodologies for modeling realistic polycrystalline magnetic films and devices". Dr. Lubarda finished his BSc studies of physics in 2006 at a Department of Physics, University of California in San Diego, and MSc (in 2007) and PhD (in 2012) studies of materials science and engineering at the same university in their Materials Science and Engineering Program. His research area is computational micromagnetics and device physics. He is a recipient of 7 honours and awards: Elected member of the *Center for Young Scientists* of the *Montenegrin Academy of Sciences and Arts* (March 2014); The 2013 Young Researcher Award from the Montenegrin Academy of Sciences and Arts (December, 2013); The Montenegrin Ministry of Science Annual Award for the Most Outstanding Scientist in Montenegro Under the Age of 35 (December, 2013); Award from the MRS- Serbia for the work on polycrystalline magnetic films and devices presented at 12YRC 2013, held in Belgrade from December 11-13, 2013; Article *APL*, 99, 13 (2011) selected for publication by the American Institute of Physics and the American Physical Society in corporation with other societies and publishers in the October 10, 2011 issue of *Virtual Journal of Nanoscale Science & Technology*; Travel award for the 2010 IEEE Magnetics Society Summer School in Dresden, Germany (2010) - 11th Joint MMM/Intermag Conference, Washington DC, student travel grant recipient (2010). He participated in 16 research projects and 5 research workshops. Until now, Dr. Lubarda presented results of his studies at 26 conferences and published 11 papers in peer-reviewed journals.

Ivana Jevremović, PhD student at the Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia, presented "Use of quartz crystal microbalance (QCM) measurements to investigate novel top-of-the-line corrosion (TLC) mitigation method", by Ivana Jevremović, Feranando Farelas, Marc Singer, Srdjan Nešić, Vesna Mišković-Stanković. Ms. Jevremović finished her MSc studies in chemical engineering at the Department of Physical Chemistry and Electrochemistry, Faculty of Technology and Metallurgy, University of Belgrade in 2010 and enrolled the PhD studies at the same Faculty. She works as a Research Assistant at the Inovation center of the Faculty of Technology and

Metallurgy, University of Belgrade. She was on a 10 months internship as a research scholar at Institute for Corrosion and Multiphase Technology, Ohio University, where she performed the research related to her PhD thesis on the corrosion inhibition of carbon steel in CO_2 environment. She won the third prize in the category of Harvey Herro Applied corrosion technology within NACE student poster sessions for a poster titled " Top-of-the-line corrosion (TLC) mitigation of mild steel in CO_2 environment using corrosion inhibitor injected within a Foam Carrier in Salt Lake City, USA (2012). She was awarded by Serbian Chemical Society for the overall achievement during B.Sc. studies. Her research interest is particularly focused on the corrosion inhibition of mild steel in CO_2 environment. She is a member of the Serbian Chemical Society and the American Association of Engineers Corrosion (National Association of Corrosion Engineers, NACE). She has published 5 papers in peer-reviewed journals and 18 in conference proceedings.

Dr. Rafał Poręba from the Institute of Macromolecular Chemistry AS CR, v.v.i., Prague, Czech Republic, presented "Preparation and characterization of waterborne polyurethane dispersions and films", by Rafał Poręba, Magdalena Serkis and Milena Špírková. Dr. Poręba finished MSc studies in 2009 at the Rzeszow University of Technology, Faculty of Chemistry, Poland, and PhD studies in 2014 at The Institute of Chemical Technology, Faculty of Chemical Technology, Prague, Czech Republic. He works at the Institute of Macromolecular Chemistry Academy of Sciences of the Czech Republic in Prague, Department of Nanostructured Polymers and Composites. He participated at 12 international conferences and is a recipient of 4 awards: best presentation at 12YRC 2013, Dean's Award in recognition of popularization of the Faculty of Chemistry among the youth through organization and leading of chemical shows for secondary school students in 2008, and the annual Rector's Award in acknowledgement of scientific and organizational work in 2007 and 2008.

Violeta Nikolić, PhD student and Postgraduate Research Fellow at the Vinča Institute, Condensed Matter Physics Laboratory, University of Belgrade, Belgrade, Serbia, presented "Spin glass like behaviour of magnetite nanoparticle system obtained by thermal decomposition of acetylacetonate precursor", by Violeta Nikolić, Vojislav Spasojević, Vladan Kusigerski, Marija Perović, Ana Mraković, Marko Bosković, Jovan Blanuša. Ms. Nikolić finished her BSc and MSc studies in 2010 and 2011, respectively, at the Faculty of Physical Chemistry, University of Belgrade. She is a member of Society of Physical Chemists of Serbia and Materials Research Society of Serbia and participated at IV International Scientific Conference *Contemporary Materials 2011* – Banja Luka, 12YRC 2013 and YUCOMAT 2014. She participates at the following teams and projects: 2011-2014. – Project: **"**Magnetic and with radionuclides marked nanostructured materials applicable in medicine"; part of the VINCENT Center of Excellence (National R&D Centre of Excellence for Knowledge-based multifunctional materials; a part of the VINCA Institute); FP7-ERA Chairs project – **"**Strengthening of the MagBioVin Research and Innovation Team for Development of Novel Approaches for Tumour Therapy based on Nanostructured Materials".

Programme
Thirteenth Young Researchers Conference
Materials Science and Engineering

Wednesday, December 10, 2014

08.30 Registration

09.00 – 10.00 Opening Ceremony of the Thirteenth Young Researchers Conference – Materials Science and Engineering
Dr. Smilja Marković, President of the Programming and Organizing Committee
Prof. Dr. Dragan Uskoković, President of the Materials Research Society of Serbia
Academician Zoran Djurić, Director of the Institute of Technical Sciences of SASA
12th YRC 2013 Awards

10.00 – 11.30 1st Session – Biomaterials I
Chairpersons: Dr. Magdalena Stevanović and Marija Babić

10.00 – 10.15 Polymeric matrices based on 2-hydroxyethyl acrylate and itaconic acid for controlled drug release
Marija M. Babić, Bojan Dj. Božić, Katarina M. Antić, Jovana S. Jovašević Vuković, Marija D. Perišić, Jovanka M. Filipović, Simonida Lj. Tomić
Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

10.15 – 10.30 Mesoporous silica nanoparticles and their application in drug delivery
Sanja Milenković[1], Nikola Knežević[1,2], Aleksandar Djordjević[1], Danica Jović[1], Ivana Borišev[1]
[1]Department of Chemistry, Biochemistry and Environmental Protection, Faculty of Science, University of Novi Sad, Trg Dositeja Obradovića 3, 21000 Novi Sad, Serbia, [2]European University-Faculty of Pharmacy, Trg mladenaca 5, 21000 Novi Sad, Serbia

10.30 – 10.45 Effect of a molecular weight on the release process from alginate microbeads

Jovana M. Ilić[1], Aleksandar S. Grujić[1], Mirko Z. Stijepović[1], Jasna T. Stajić-Trošić[1], Branko M. Bugarski[2]

[1]University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Njegoševa 12, 11000 Belgrade, Serbia, [2]University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Serbia

10.45 – 11.00 Solid state characterization of maltose-embedded hemoglobin from porcine slaughterhouse blood

Katarina S. Bukara[1], Ivana T. Kostić[1], Vesna Lj. Ilić[2], Smilja B. Marković[3], Nenad Ž. Lazarević[4], Branko M. Bugarski[1]

[1]Department of Chemical Engineering, Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11060 Belgrade, Serbia, [2]Institute for Medical Research, University of Belgrade, Dr Subotica 4 POB 39, 11129 Belgrade 102, Serbia, [3]Institute of Technical Sciences of SASA, Knez Mihailova 35/IV P.O. BOX 377, 11000 Belgrade, Serbia, [4]Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Zemun, Belgrade, Serbia

11.00 – 11.15 Influence of whey proteins addition on mechanical stability of biopolymer beads with immobilized probiotics

Nataša Obradović[1], Tanja Krunić[1], Ivana Damnjanović[1], Ana Jenić[2], Marica Rakin[2], Marko Rakin[2], Branko Bugarski[2]

[1]University of Belgrade, Innovation Centre of the Faculty of Technology and Metallurgy, Karnegijeva 4, 11120 Belgrade, Serbia, [2]University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11120 Belgrade, Serbia

11.15 – 11.30 Optimization of chitosan gel preparation for supercritical impregnation of thymol

Stoja Milovanović[1], Milica Pantić[2], Jasna Ivanović[1], Irena Žižović[1]

[1]University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Serbia, [2]University of Maribor, Faculty of Chemistry and Chemical Engineering, Smetenova ulica 17, 2000 Maribor, Slovenia

11.30 – 11.45 Break

11.45 – 13.30 2nd Session – Biomaterials II
Chairpersons: Prof. Dr. Nenad Ignjatović and Dr. Sanja Eraković

11.45 – 12.00 Effect of surface modification on corrosion behavior of Mg-based implants

Aydin Tahmasebifar[1], Said Murat Kayhan[1], Muammer Koç[2], Zafer Evis[1]
[1]Middle East Technical University, Dept. of Engineering Sciences, Ankara, 06800, Turkey, [2]Istanbul Sehir University, Dept. of Industrial and System Engineering, Istanbul, 34660, Turkey

12.00 – 12.15 Mechanical properties of micro-scale porous surfaces for Mg-based implants

Said Murat Kayhan[1], Aydin Tahmasebifar[1], Zafer Evis[1], Muammer Koç[2]
[1]Middle East Technical University, Dept. of Engineering Sciences, Ankara, 06800, Turkey, [2]Istanbul Şehir University, Dept. of Industrial and System Engineering, Istanbul, 34660, Turkey

12.15 – 12.30 Plasma surface modification of chitosan films to control biocompatibility

Tatiana S. Demina[1], M.G. Drozdova[2], M.Yu. Yablokov[1], A.B. Gilman[1], T.A. Akopova[1], E.A. Markvicheva[2], A.N. Zelenetskii[1]
[1]Enikolopov Institute of Synthetic Polymer Materials RAS, Moscow, Russia, [2]Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry RAS, Moscow, Russia

12.30 – 12.45 Hemolytic, antimicrobial and histological analysis of nanocomposite biomaterials based on HAp and polymers

Zorica Ajduković[1], Nenad Petrović[2], Nenad Ignjatović[3], Tatjana Mihajilov-Krstev[4], Jelena Rajković[4], Dragana Kenic Marinković[5], Dragan Uskoković[3]
[1]University of Niš, Faculty of Medicine, Clinic of Stomatology, Department of Prosthodontics, Bulevar Zorana Djindjića 81, 18000 Niš, Serbia, [2]University of Niš, Faculty of Medicine, Department of Dentstry, Bulevar Zorana Djindjića 81, 18000 Niš, Serbia, [3]Institute of Technical Sciences of SASA, Knez Mihailova 35/IV, PO Box 377, 11000 Belgrade, Serbia, [4]University of Niš, Faculty of Science and Mathematics, Department of Biology and Ecology, Višegradska 33, P. O. Box 224, 18000 Niš, Serbia, [5]Private dental practice "Kalodent" Niš, Pasterova 15, 18 000 Niš, Serbia

12.45 – 13.00 Electrophoretic hybrid hydroxyapatite/graphene coatings on titanium

Sanja Eraković[1], Ana Janković[1], Miodrag Mitrić[2], Ivana Z. Matić[3], Zorica D. Juranić[3], Gary C.P. Tsui[4], Chak-yin Tang[4], Vesna Mišković-Stanković[1], Kyong Yop Rhee[5], Soo Jin Park[6]
[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 Oncology and Radiology of Serbia, Belgrade, Serbia, [4]Department of Industrial and Systems Engineering, The Hong Kong

Polytechnic University, Hung Hom, Kowloon, Hong Kong, PR China, [5]Department of Mechanical Engineering, Kyung Hee University, Yongin, Korea, [6]Chemistry, Collage of Natural Sciences, Inha University, Incheon, Korea

13.00 – 13.15 Processing and properties of bioceramic materials based on hydroxyapatite doped with ions of magnesium and copper
Tanja Stamenić, Djordje Veljović, Rada Petrović, Djordje Janaćković
Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, Belgrade, Serbia

13.15 – 13.30 Sintered bioactive glass-ceramics prepared from strontium containing polyphosphate glass
Vladimir S. Topalović[1], V.D. Živanović[1], S.D. Matijašević[1], J.D. Nikolić[1], S.R. Grujić[2], S.V. Smiljanić[2], S.N. Zildžović[1]
[1]Institute for the Technology of Nuclear and other Mineral Raw Materials, 86 Franchet d'Esperey St., 11000 Belgrade, Serbia, [2]Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11000 Belgrade, Serbia

13.30 – 13.45 Break

13.45 – 15.15 3rd Session – Biomaterials III
Chairpersons: Dr. Djordje Veljović and Jovana Jovašević

13.45 – 14.00 Early fracture healing in ovariectomized rats femur helped with alfacalcidol and platelet-rich plasma on bio-oss carrier
Jelena Rajković[1], Stevo Najman[2], Sanja Stojanović[2], Ljubiša Djordjević[1], Vladimir Cvetković[1], Zorica Ajduković[3]
[1]University of Niš, Faculty of Science and Mathematics, Department of Biology and Ecology, Niš, Serbia; [2]University of Niš, Faculty of Medicine, Department for Cell and Tissue Engineering; Institute of Biology and Human Genetics, Niš, Serbia; [3]University of Niš, Faculty of Medicine, Clinic of Stomatology, Department of Prosthodontics, Niš, Serbia

14.00 – 14.15 Fabrication and characterization of electrospun PCL/PHBHHx fibers
Giulia Rella[1], Ranjana Rai[1], Marwa Tallawi[1], Judith E. Roether[2], Joachim Kaschta[2], Dirk W. Schubert[2], Aldo R. Boccaccini[1]
[1]Institute of Biomaterials, Department of Materials Science and Engineering, University of Erlangen-Nuremberg, Cauerstr. 6, 91058 Erlangen, Germany, [2]Institute of Polymer Materials, Department of Materials Science and

Engineering, University of Erlangen-Nuremberg, Martensstr. 7, 91058 Erlangen, Germany

14.15 – 14.30 Antibacterial activity of a new clay-TiO_2 nanocomposits on gram positive and gram-negative bacteria
Amir Lashgari, Shahriar Ghamami
Department of Chemistry, Faculty of Science, Imam Khomeini International University, Qazvin, Iran

14.30 – 14.45 Synthesis, characterization, anti-tumor and antibacterial activities study of nano leaf CuO
Shahriar Ghamami, Amir Lashgari
Department of Chemistry, Faculty of Science, Imam Khomeini International University, Qazvin, Iran

14.45 – 15.00 Evaluation of genotoxicity of (meth)acrylate polymers in HeLa cells by using alkaline comet assay
Dijana Takić Miladinov[1], Jelena Najdanović[2], Dragana Tričković-Vukić[2], Sanja Stojanović[2], Simonida Tomić[3], Perica Vasiljević[1], Stevo Najman[2]
[1]University of Niš, Faculty of Science and Mathematics, Department of Biology and Ecology, Niš, Serbia; [2]University of Niš, Faculty of Medicine, Institute of Biology and Human Genetics, Niš, Serbia; [3]University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia

15.00 – 15.15 Structural, release and antibacterial properties of pH sensitive hydrogels based on 2-hydroxyethyl acrylate and itaconic acid with incorporated copper(II) ions
Jovana S. Jovašević Vuković, Marija M. Babić, Katarina M. Antić, Marija D. Perišić, Jovanka M. Filipović, Simonida Lj. Tomić
Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

15.15 – 16.15 Lunch Break with refreshments

16.15 – 18.00 4th Session – Nanomaterials: Synthesis and characterization
Chairpersons: Dr. Dragana Jugović and Dr. Bjorn Eckhardt

16.15 – 16.30 Investigation of Fe_3O_4@cyanuric chloride supermagnetice nanoparticles effects on physical properties of flexible polyurethane foam nanocomposites
Mir Mohammad Alavi Nikje, Seideh Leila Rahmani Andabil and Lida Sarchami

Department of Chemistry, Faculty of Science, Imam Khomeini International University, Qazvin, Iran

16.30 – 16.45 Preparation and characterization of polyurethane rigid foam nanocomposites by incorporation of magnetic core-shell Fe_3O_4@APTS/ 2-Chloropyridine nanoparticles

Mir Mohammad Alavi Nikje, Lida Sarchami and Seideh Leila Rahmani Andabil
Department of Chemistry, Faculty of Science, Imam Khomeini International University, Qazvin, Iran

16.45 – 17.00 The synthesis of micelle-templated mesoporous metal carbonates and metal oxides

Björn Eckhardt, Erik Ortel, Ralph Kraehnert
Technical University of Berlin, Berlin, Germany

17.00 – 17.15 The influence of synthesis parameters on physicochemical properties of hydrothermally/solvothermally derived cobalt ferrite nanoparticles

Sonja Jovanović[1], Matjaž Spreitzer[2], Danilo Suvorov[2]
[1]Laboratory of Physics, Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia, [2]Advanced Materials Department, Jožef Stefan Institute, Ljubljana, Slovenia

17.15 – 17.30 Fullerene C_{60} dimer oxides

Igor Medić, Aleksandar Djordjević, Ivana Borišev, Danica Jović
Department of Chemistry, Biochemistry and Environmental Protection, Faculty of Science, University of Novi Sad, Trg D. Obradovića 3, 21000 Novi Sad, Serbia

17.30 – 17.45 Photocatalytic behavior of nanostructured systems based on Ag&ZnO synthesized by solvothermal method

Lidia Muñoz[1], A. Sierra-Fernández[1,2], L.S. Gómez-Villalba[2], O. Milošević[3], M.E. Rabanal[1]
[1]University Carlos III of Madrid and IAAB, Department of Materials Science and Engineering and Chemical Engineering, Avda. Universidad 30, 28911 Leganes, Madrid, Spain, [2]Instituto de Geociencias (CSIC, UCM), C/ José Antonio Novais 2, 28040 Madrid, Spain, [3]Institute of Technical Sciences of SASA, Knez Mihailova 35/IV, 11000 Belgrade, Serbia

17.45 – 18.00 Release profiles of a new quinolone derivative from mesoporous silica materials

Mihaela Deaconu[1,2], Lucia Pintilie[2], Dragoş Gudovan[1], Dan Mihaiescu[1]
[1]University "Politehnica" of Bucharest, Faculty of Applied Chemistry and Materials Science, 1-7 Gh Polizu Street, 011061 Bucharest, Romania,

[2]National Institute for Chemical-Pharmaceutical Research and Development, 112 Vitan Av., 031299 Bucharest, Romania

Thursday, December 11, 2014

09.00 – 10.45 5th Session – Theoretical Modelling of Materials I
Chairpersons: Dr. Željka Nikitović and Dr. Siniša Vučenović

09.00 – 09.15 Helically coiled carbon nanotubes as nanomechanical oscillators
Zoran P. Popović, Milan Damnjanović, Ivanka Milošević
Faculty of Physics, University of Belgrade, 11001 Belgrade, Serbia

09.15 – 09.30 Electronic nature of the low-temperature anomalies of specific heat in carbon nanotubes
Alexander Ponomarev[1], Valery Egorushkin[1], Natalia Melnikova[2], Nadezhda Bobenko[1]
[1]Institute of Strength Physics and Materials Science Siberian Branch of Russian Academy of Sciences, Tomsk 634021, Russia, [2]V.D. Kuznetsov Siberian Physical Technical Institute of Tomsk State University, Tomsk 634050, Russia

09.30 – 09.45 Carbon nanotubes based active area of field effect transistors – basic analytical models
Nikola V. Stojiljković[1], Petar M. Lukić[1], Vladan M. Lukić[1], Rajko M. Šašić[2]
[1]Faculty of Mechanical Engineering, University of Belgrade, Kraljice Marije 16, 11120 Belgrade, Serbia, [2]Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11120 Belgrade

09.45 – 10.00 Investigation of Risken–Nummedal–Graham–Haken instabilities in quantum cascade lasers
Nikola Vuković[1], Jelena Radovanović[1], Vitomir Milanović[1], Dmitri L. Boiko[2]
[1]School of Electrical Engineering, University of Belgrade, RS-11120, Belgrade, Serbia, [2]Centre Suisse d'Electronique et de Microtechnique SA, 2002, Neuchâtel, Switzerland

10.00 – 10.15 First principle calculation of phonons and electron-phonon interaction in graphene
Jelena Pešić, Vladimir Damljanović, Radoš Gajić
Graphene laboratory, Center for Solid State Physics and New Materials, Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Belgrade

10.15 – 10.30 Wake effect in the interaction of slow correlated charges with supported graphene due to plasmon-phonon hybridization

Tijana Marinković[1], Ivan Radović[1], Duško Borka[1], Zoran L. Mišković[2]
[1]VINČA Institute of Nuclear Sciences, University of Belgrade, P.O. Box 522, 11001 Belgrade, Serbia, [2]Department of Applied Mathematics, and Waterloo Institute for Nanotechnology, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1

10.30 – 10.45 Analytical and computational modeling for the study of magnetization response in nanoscale heterostructures envisioned for coming generation memory and processing applications

Marko V. Lubarda[1], Majd Kuteifan[2], Sidi Fu[2], Ruinan Chang[2], Marco A. Escobar[2], Stephane Mangin[3], Eric E. Fullerton[2], Vitaliy Lomakin[2]
[1]Faculty of Polytechnics, University of Donja Gorica, 81000 Podgorica, Montenegro, [2]Center for Magnetic Recording Research, University of San Diego, California, USA, [3]Institut Jean Lamour, Université de Lorrain, Vandoeuvre-Les-Nancy, France

10.45 - 11.15 Break

11.15 – 12.45 6th Session – Theoretical Modelling of Materials II
Chairpersons: Dr. Boban Stojanović and Zoran Popović

11.15 – 11.30 Minimal volume photoacoustic cell as a Helmholtz resonator

Mioljub Nešić[1,2], Marica Popović[1,2], M. Rabasović[3] , Dragan Markušev[3], Slobodanka Galović[2]
[1]School of Electrical Engineering, University of Belgrade, Bulevar Kralja Aleksandra 73, 10120, Belgrade, Serbia, [2]Vinca Institute of Nuclear Sciences, University of Belgrade, PO Box 522, 10001, Belgrade, Serbia, [3]Institute of Physics, Belgrade, University of Belgrade, Pregrevica 118, 11080 Zemun, Serbia

11.30 – 11.45 Optoelectronic and charge carrier hopping properties of small diameter boron nitride nanotubes

Stevan Armaković[1], Sanja J. Armaković[2], Jovan P. Šetrajčić[1]
[1]University of Novi Sad, Faculty of Sciences, Department of Physics, Trg Dositeja Obradovića 4, 21000, Novi Sad, Serbia, [2]University of Novi Sad, Faculty of Sciences, Department of Chemistry, Biochemistry and Environmental Protection, Trg Dositeja Obradovića 3, 21000, Novi Sad, Serbia

11.45 – 12.00 Modification of electronic and chemical properties of graphene by oxygen-containing functional groups – First principles study
Ana Dobrota, Igor Pašti
University of Belgrade, Faculty of Physical Chemistry, Studentski trg 12-16, 11158 Belgrade, Serbia

12.00 – 12.15 Photoisomerisation mechanism of novel molecular switches – a theoretical investigation
Dušan Dimić, Milena Petković
Faculty of Physical Chemistry, University of Belgrade, Studentski trg 12-16, 11 158 Belgrade

12.15 – 12.30 Determination of paracetamol in pharmaceuticals by pulse perturbation of the Bray-Liebhafsky oscillatory reaction
Ana Stanojević[1], Nataša Pejić[2], Ljiljana Kolar-Anić[1, 3], Slobodan Anić[3], Dragomir Stanisavljev[1], Željko Čupić[3]
[1]Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia, [2]Faculty of Pharmacy University of Belgrade, Belgrade, Serbia, [3]Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Department of Catalysis and Chemical Engineering, Belgrade, Serbia

12.30 – 12.45 Application of multi-criteria decision making (MCDM) methods for biomedical materials selection
Dušan Petković, Miloš Madić, Miodrag Manić, Goran Radenković
Faculty of Mechanical Engineering, University of Niš, Aleksandra Medvedeva 14 Niš, Serbia

12.45 – 14.15 Lunch break with refreshments

14.15 – 15.45 7th Session – Metallurgy and Corrosion of Materials I
Chairpersons: Dr. Dragomir Glišić and Ivana Jevremović

14.15 – 14.30 Representation of microstructure of artificially aged 6061 aluminum alloy using two different etching solutions
Uroš Stamenković
Univerzitet u Beogradu, Tehnički fakultet u Boru, Vojske Jugoslavije 12, 19210 Bor, Serbia

14.30 – 14.45 Electrochemical and thermodynamic investigation of talloil diethylenetriamine imidazoline as corrosion inhibitor for carbon dioxide corrosion of mild steel
Ivana Jevremović[1], Marc Singer[2], Srđan Nešić[2], Vesna Mišković-Stanković[1]

[1]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia; [2]Institute for Corrosion and Multiphase Technology, Ohio University, Athens, OH, USA

14.45 – 15.00 Anticorrosive epoxy/clay nanocomposites and nanocoatings
Miloš Tomić[1], Violeta Likić[2], Branko Dunjić[1], Jasna Djonlagić[1]
[1]Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, Belgrade, Serbia, [2]Zvezda-Helios, Radovana Grkovića 24, 32000 Gornji Milanovac, Serbia

15.00 – 15.15 Impact of crankshaft material on the elastic line deformation of his main journal
Asllan Hajderi[1], R. Kosova[2]
[1]Department of Mechanic and Transport, "Aleksander Moisiu" University" Durres, Albania, [2]Department of Mathematics "Aleksander Moisiu" University" Durres, Albania

15.15 – 15.30 Investigation on kinetics of hydrogen absorption by Zr-based alloys
Dragan Conić, Katarina Batalović
Laboratory for nuclear and plasma physics, Vinca Institute of nuclear sciences, University of Belgrade, P.O.Box 522, Belgrade, Serbia

15.30 – 15.45 Thermally induced structural transformations of $Fe_{40}Ni_{40}P_{14}B_6$ amorphous alloy
Milica M. Vasić, Vladimir A. Blagojević, Dragica M. Minić
Faculty of Physical Chemistry, University of Belgrade, Studentski trg 12-16, Belgrade, Serbia

15.45 – 16.00 Break

16.00 – 17.00 8th Session – Metallurgy and Corrosion of Materials II
Chairpersons: Dr. Dragomir Glišić and Ivana Jevremović

16.00 – 16.15 Mechanochemical treatment – a new way in powder metallurgy diamonds tools technology
Teodora Sikora[1], Janusz Konstanty[2], Andrzej Romański[2], Krystyna Wieczorek-Ciurowa[1]
[1]Cracow University of Technology, Faculty of Chemical Engineering and Technology, Cracow, Poland, [2]AGH - University of Science and Technology, Faculty of Metals Engineering and Industrial Computer Science, Cracow, Poland

16.15 – 16.30 Prediction of electrical resistivity values for binary alloys in Ag-Au-Cu-Pd system using artificial neural networks
Nikola Kostić, Dragana Živković, Saša Stojadinović, Dragan Manasijević, Ljubiša Balanović
University of Belgrade, Technical faculty in Bor, VJ12, 19210 Bor, Serbia

16.30 – 16.45 Train brakes for high speed trains
Nemanja Trifunović[1], Dejan Trifunović[2], Mirko Stijepović[1], Aleksandar Grujić[1], Jasna Stajić-Trošić[1]
[1]University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Njegoševa 12, 11000 Belgrade, Serbia, [2]University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Serbia

16.45 – 17.00 The magnetocaloric properties of the $Mn_{2-x}Fe_xP_{0.5}As_{0.5}$ (x = 1.0 and 0.7) compounds
Igor Radelytskyi[1], R. Szymczak[1], A. Ślawska-Waniewska[1], V. Dyakonov[1,2]
[1]Institute of Physics, PAS, 02-668 Warsaw, Al. Lotników 32/46, Poland, [2]Donetsk Institute for Physics and Engineering named after O.O. Galkin, NASU, 83114 Donetsk, R. Luxembourg str. 72, Ukraine

17.00 – 17.15 Break

17.15 – 18.15 9th Session – Polymer Science
Chairpersons: Prof. Dr. Gordana Ćirić-Marjanović and Dr. Tatiana Demina

17.15 – 17.30 Chitosan-based materials for laser stereolithography
Tatiana S. Demina[1], T.A. Akopova[1], P.S. Timashov[2], V.N. Bagratashvilli[2], A.N. Zelenetskii[1]
[1]Enikolopov Institute of Synthetic Polymer Materials RAS, Moscow, Russia, [2]Institute on Laser and Information Technologies RAS, Troitsk, Russia

17.30 – 17.45 Investigations on Methacrylate based polyHIPEs for possible application as separators in Li-ion batteries
Werner Paschinger, Alexander Bismarck
Institute for Materials Chemistry & Research, University of Vienna, Waehringer Straße 42, A-1090 Wien, Austria

17.45 – 18.00 Synthesis and characterization of biodegradable diblock and triblock copolymers based on PCL and PEO
Marijana Ponjavić, Marija Nikolić, Jasna Djonlagić
Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva

4, Belgrade, Serbia

18.00 – 18.15 Synthesis and characterization of modified pectin films intended for food packaging application

Sanja Šešlija[1], Aleksandra Nešić[2], Roberto Avolio[3], Maria Errico[3], Mario Malinconico[3], Sava Veličković[4†], Melina Kalgasidis Krušić[4], Ivanka Popović[4]

[1]Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Belgrade, Serbia, [2]Vinča Institute for Nuclear Sciences, University of Belgrade, Belgrade, Serbia, [3]Institute on Polymer Chemistry and Technology, Pozzuoli (Na), Italy, [4]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

Friday, December 12, 2014

09.00 – 11.00 10th Session – Composites
Chairpersons: Dr. Edin Suljovrujić and Nataša Tomić

09.00 – 09.15 Adhesion effects of ethylene-vinyl acetate copolymer (EVA) on optical fibers

Nataša Z. Tomić, Bojan I. Medjo, Marko P. Rakin, Radmila M. Jančić–Heinemann, Radoslav R. Aleksić[†]

University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11120 Belgrade, Serbia

09.15 – 09.30 Impact testing of kolon *p*-aramid fabrics with various types of reinforcement

Vera Obradović, Dušica Stojanović, Miloš Petrović, Irena Živković, Vesna Radojević, Petar Uskoković, Radoslav Aleksić[†]

University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11120 Belgrade, Serbia

09.30 – 09.45 Mechanical properties of experimental composites containing a low-shrinkage monomer and monoacylphosphine oxide photoinitiator

Jovana Stašić[1], Dragica Manojlović[1], Ivana Cvijović-Alagić[2], Maja Lezaja[1], Tatjana Savić-Stanković[1], Vesna Miletić[1]

[1]University of Belgrade, School of Dental Medicine, DentalNet Research Group, Rankeova 4, Belgrade, Serbia, [2]University of Belgrade, Institute of Nuclear Sciences „Vinča“, P.O. Box 522, 11000 Belgrade, Serbia

09.45 – 10.00 Composite solid electrolytes based on $LiNO_2$

Yulia G. Mateyshina, A.S. Ulihin, N.F. Uvarov

Institute of Solid State Chemistry and Mechanochemistry, Kutateladze 18, Novosibirsk, Russia

10.00 – 10.15 Structure and properties of $BaTiO_3 – Ni_{(1-x)}Zn_{(x)}Fe_2O_4$ composites
Adis S. Džunuzović[1], N.I. Ilić[1], M.M. Vijatović Petrović[1], J.D. Bobić[1], R. Grigalaitis[2], B.D. Stojanović[1]
[1]Institute for Multidisciplinary Research, Belgrade University, Belgrade, Serbia, [2]Faculty of Physics, Vilnius University, Vilnius, Lithuania

10.15 – 10.30 Dielectrical properties of Er_2O_3 doped $BaTiO_3$ ceramics
Miloš Marjanović, Miloš Djordjević, Vesna Paunović
University of Niš, Faculty of Electronic Engineering, Aleksandra Medvedeva 14, Niš, Serbia

10.30 – 10.45 Effect of Y-doping on structure and properties of multiferroic $BiFeO_3$ ceramics
Nikola Ilić[1], Bojan Stojadinović[2], Adis Džunuzović[1], Jelena Bobić[1], Zorana Dohčević-Mitrović[2], Biljana Stojanović[1]
[1]Institute for Multidisciplinary Research, University of Belgrade, Kneza Višeslava 1, 11000 Belgrade, Serbia, [2]Institute of Physics, University of Belgrade, Pregrevica 118, Belgrade, Serbia

10.45 – 11.00 The role of mechanochemistry in preparation of high dielectric constant and low-loss electroceramics
Piotr Dulian [1], W. Bąk [2], Cz. Kajtoch [2], K. Wieczorek-Ciurowa[1]
[1]Faculty of Chemical Engineering and Technology, Cracow University of Technology, 24, Warszawska Str., 31-155 Cracow, Poland, [2]Institute of Physics, Pedagogical University, 2, Podchorążych Str., 30-084 Cracow, Poland

11.00 - 11.15 Break

11.15 – 12.45 11th Session – Catalysis
Chairpersons: Dr. Predrag Banković and Mila Krstajić

11.15 – 11.30 Analysis of catalyst wetting efficiency influence on performances of industrial TBR for hydrodesulfurization and hydrodearomatization reactions
Ivana M. Mijatović, Sandra B. Glišić, Aleksandar M. Orlović
Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11120 Belgrade, Serbia

11.30 – 11.45 Formic acid electrooxidation on carbon supported platinum catalyst with preferential plane orientation

Mila N. Krstajić[1], Sanja I. Stevanović[1], Snežana Lj. Gojković[2], Vladislava M. Jovanović[1]
[1]*Department of Electrochemistry, ICTM, University of Belgrade, Serbia*
[2]*Faculty of Technology and Metallurgy, University of Belgrade, Serbia*

11.45 – 12.00 Effect of electron acceptors on the kinetics of alprazolam photodegradation under simulated solar irradiation

Nina L. Finčur, Daniela V. Šojić, Vesna N. Despotović, Biljana F. Abramović
University of Novi Sad, Department of Chemistry, Biochemistry and Environmental Protection, Faculty of Sciences, Trg D. Obradovića 3, 21000 Novi Sad, Serbia

12.00 – 12.15 Influence of calcination temperature of La-doped titania to the degradation efficiency of beta blockers in water suspension

Sanja Armaković[1], Biljana Abramović[1], Mirjana Grujić-Brojčin[2], Maja Šćepanović[2], Aleksandar Golubović[2]
[1]*Department of Chemistry, Biochemistry and Environmental Protection, Faculty of Sciences, University of Novi Sad, Trg D. Obradovića 3, 21000 Novi Sad, Serbia,* [2]*Center for Solid State Physics and New Materials, Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Belgrade, Serbia*

12.15 – 12.30 Hydrogen storage in MgH_2 enhanced by addition of VO_2(B)

Sanja Milošević[1], Luca Pasquini[2], Igor Milanović[1], Andjelka Djukić[1], Ljiljana Matović[1], Željka Rašković-Lovre[1], Jasmina Grbović Novaković[1]
[1]*Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia,* [2]*Department of Physics and Astronomy, University of Bologna, Bologna, Italy*

12.30 – 12.45 Desorption properties of MgH_2 -TiO_2 nanocomposites for hydrogen storage

Ana Mraković[1], Sanja Milošević[1], Radojka Vujasin[1], Slavko Mentus[2], Sandra Kurko[1], Jasmina Grbović Novaković[1]
[1]*Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia,* [2]*Faculty of Physical Chemistry, University of Belgrade, Belgrade, Serbia*

12.45 – 13.45 Lunch break with refreshments

13.45 – 15.15 12th Session – Environmental Science
Chairmen: Dr. Smilja Marković and Mina Jovanović

13.45 – 14.00 Magnetic macroporous copolymer for technetium-99 removal from contaminated groundwater

Bojana Ekmeščić[1], Drina Janković[2], Danijela Maksin[2], Aleksandar Vukadinović[2], Aleksandra Nastasović[1], Vojislav Spasojević[2], Vladan Kusigerski[2]

[1]University of Belgrade, ICTM, Njegoševa 12, Belgrade, Serbia, [2]University of Belgrade, Vinča Institute of Nuclear Sciences, P.O. Box 522, Belgrade, Serbia

14.00 – 14.15 Technetium-99 removal by amino-functionalized macroporous copolymer

Zvjezdana Sandić[1], Bojana Ekmeščić[3], Aleksandar Vukadinović[2], Drina Janković[2], Danijela Maksin[2], Ljiljana Suručić[3], Aleksandra Nastasović[3]

[1]University of Banja Luka, Faculty of Sciences, Mladena Stojanovića 2, Banja Luka, Republic of Srpska, B&H, [2]University of Belgrade, Vinča Institute of Nuclear Sciences, P.O. Box 522, Belgrade, Serbia, [3]University of Belgrade, ICTM, Njegoševa 12, Belgrade, Serbia

14.15 – 14.30 The application of the polymer-zeolyte composite materials for the waste gas treatment

Dragutin M. Nedeljković, Aleksandar S. Stajčić, Aleksandar S. Grujić, Mirko Z. Stijepović, Jasna T. Stajić-Trošić

University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Njegoševa 12, 11000 Belgrade, Serbia

14.30 – 14.45 Mn(II) adsorption onto commercial zeolite A: process kinetics and mechanism

Mina Jovanović[1], Iztok Arcon[2,3], Nataša Novak Tusar[4,2], Bojana Obradović[5], Nevenka Rajić[5]

[1]Innovation Center of the Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Serbia, [2]University of Nova Gorica, Vipavska 13, 5000 Nova Gorica, Slovenia, [3]Institute Jozef Stefan, Jamova 39, 1000 Ljubljana, Slovenia, [4]National Institute of Chemistry, Hajdrihova 19, 1000 Ljubljana, Slovenia, [5]Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11000 Belgrade, Serbia

14.45 – 15.00 Dynamic adsorption of Rhodamine B from dilute aqueous solutions using negatively-charged membrane adsorbers

Tanja Tomković, Aleksandra Nastasović, Filip Radovanović

University of Belgrade, Institute for Chemistry, Technology and Metallurgy, Njegoševa 12, Belgrade

15.00 – 15.15 Organic/inorganic nanosilica support role in the recovery of terephthalic acid from poly(ethylene terephthalate) wastes
Elmira Ghamary, Mir Mohammad Alavi Nikje
Chemistry Department, Faculty of Science, Imam Khomeini International University, PO Box: 288, Qazvin, Iran

15.15 – 15.30 Quantification of basic dyes adsorption onto mesoporous silica SBA-15 using image analysis software
Aleksandra Nešić[1], Maja Kokunesoski[1], Tatjana Volkov-Husović[2], Sava Veličković[2†]
[1]Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, [2]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

15.30 - 15.45 Break

15.45 – 17.15 13th Session – Thin films and coatings
Chairmen: Dr. Rastko Vasilić and Alexander Kukharchik

15.45 – 16.00 Study of the surface topography of thin-film conductive nanostructured coatings and the relative effects
Alexander Kukharchik[1.2], Natalia Kamanina[1,2]
[1]Lab for Photophysics of media with nanoobjects, Vavilov State Optical Institute, Kadetskaya Liniya V.O., dom.5, korpus 2, St.- Petersburg, 199053, Russia, [2]Saint-Petersburg Electrotechical University ("LETI"), St. Petersburg, Russia

16.00 – 16.15 Structural characterization of $BaTiO_3$ thin films obtained with spin coating and inkjet printing method
Jelena Vukmirović[1], Djordjije Tripković[1], Branimir Bajac[1], Nataša Samardžić[2], Elvira Djurdjić[3], Željka Cvejić[3], Goran Stojanović[2], Vladimir V. Srdić[1]
[1]Department of Materials Engineering, Faculty of Technology, University of Novi Sad, Serbia, [2]Department of Microelectronics, Faculty of Technical Sciences, University of Novi Sad, Serbia, [3]Department of Physics, Faculty of Sciences, University of Novi Sad, Serbia

16.15 – 16.30 Synthesis, structural characterization and dielectric properties of barium titanate thin films
Jovana Stanojev[1], Branimir Bajac[1], Jelena Vukmirović[1], Djordjije Tripković[1] Elvira Djurdjić[2], Željka Cvejić[2], Vladimir Srdić[1]

[1]Faculty of Technology, Department of Materials Engineering, University of Novi Sad, Bul. Cara Lazara 1, 21000 Novi Sad, Serbia, [2]Faculty of Sciences, Department of Physics, University of Novi Sad, Trg D. Obradovića 4, 21000 Novi Sad, Serbia

16.30 – 16.45 Graphene synthesis from solid precursor: the effect of annealing temperature and time

Jovana Prekodravac[1], Zoran Marković[1], Ivanka Holclajtner Antunović[2], Svetlana Jovanović[1], Milica Budimir[1], Biljana Todorović Marković[1]
[1]Vinča Institute of Nuclear Sciences, University of Belgrade, P. O. B. 522, 11001 Belgrade, Serbia, [2]Faculty of Physical Chemistry, University of Belgrade, Studentski trg 12-16, 11158 Belgrade118, P. O. B. 47, Serbia

16.45 – 17.00 Relaxation of AC conductivity of isotactic polypropylene(iPP) after treatment in a solution of LiCl at a high positive electrical potential

Ivan Petronijević[1], Filip Marinković[1], Jablan Dojčilović[1], Adriaan S. Luyt[2] and Duško Dudić[2,3]
[1]Faculty of Physics, University of Belgrade, Studentski trg 12-16, 11000 Belgrade, Serbia, [2]Department of Chemistry, University of the Free State (Qwaqwa Campus),Private Bag X13, Phuthaditjhaba 9866, South Africa, [3]University of Belgrade – Vinča Institute of Nuclear Sciences, PO Box 522, 11001, Belgrade, Serbia

17.00 – 17.15 Manganese electrodeposition with the assistance of urea in high concentration

Mihael Bučko[1], Mladen Vuruna[1], Ljubica Radović[2], Jelena B. Bajat[3]
[1]Military Academy, University of Defense, P.J. Sturma 33, Belgrade, [2]Military Technical Institute, Ratka Resanovića 1, Belgrade, [3]Faculty of Technology and Metallurgy, University of Belgrade, P.O. Box 3503, Belgrade, Serbia

17.15 – 17.30 Break

17.30 – 18.45 14th Session – Various Problems in Materials Science
Chairpersons: Dr. Ljiljana Matović and Aleksandar Matković

17.30 – 17.45 Relating nanoscopic structure to macroscopic properties of liquid-phase exfoliated graphene

Aleksandar Matković, Marijana Milićević, Ivana Milošević, Jelena Pešić, Borislav Vasić, Marko Spasenović, Radoš Gajić
Center for Solid State Physics and New Materials, Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Belgrade, Serbia

17.45 – 18.00 **Atomic force microscopy and Kelvin probe force microscopy measurements of single and few layer grapheme**

Uroš Ralević[1], Borislav Vasić[1], Aleksandar Matković[1], Roman Gorbachev[2], Radoš Gajić[1]

[1]Graphene laboratory, Center for Solid State Physics and New Materials, Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Belgrade, Serbia, [2]Centre for Mesoscience & Nanotechnology, University of Manchester, Manchester M13 9PL, UK

18.00 – 18.15 **AFM study of bacteria treated with graphene quantum dots**

Biljana Ristić[1], Marina Milenković[1], Ivana Dakić[1], Biljana Todorović-Marković[2], Momir Milosavljević[2], Milica Budimir[2], Verica Paunović[1], Miroslav Dramićanin[2], Zoran Marković[2], Vladimir Trajković[1]

[1]Institute of Microbiology and Immunology, School of Medicine, University of Belgrade, Dr. Subotica 1, 11000 Belgrade, Serbia, [2]Vinca Institute of Nuclear Sciences, University of Belgrade, 11000 Belgrade, Serbia

18.15 – 18.30 **Determination of Nd-Yag laser parameters for metal threads cleaning in textile artefacts**

Bojana Radojković[1], Slavica Ristić[1], Milorad Zrillić[2], Suzana Polić[3]

[1]Institute Goša, Milana Rakića 35, Belgrade, Serbia, [2]Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, Belgrade, [3]Central Institute for Conservation in Belgrade, Terazije 26, Belgrade, Serbia

18.30 – 18.45 **Mössbauer study of $Hf_{0.5}Ta_{0.5}Fe_2$**

Ivan Madjarević[1], V. Ivanovski[1], B. Cekić[1], C. Petrović[2]

[1]Laboratory of Nuclear and Plasma Physics, University of Belgrade, Vinča Institute of Nuclear Sciences, P.O. Box 522, 11001 Belgrade, Serbia, [2]Condensed Matter Physics and Materials Science Department, Brookhaven National Laboratory, Upton, New York 11973, USA

18.45 **Closing Ceremony**

I/1

Polymeric matrices based on 2-hydroxyethyl acrylate and itaconic acid for controlled drug release

Marija M. Babić, Bojan Dj. Božić, Katarina M. Antić, Jovana S. Jovašević Vuković, Marija D. Perišić, Jovanka M. Filipović, Simonida Lj. Tomić
Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

The focus of this study was to design an enhanced drug delivery system for the controlled release of a hydrophobic drug, Oxaprozin. New poly(2-hydroxyethyl acrylate/itaconic acid) (P(HEA/IA)) hydrogels were synthesized by the free radical crosslinking copolymerization and tested as drug carriers. P(HEA/IA) copolymer chemical structure was confirmed using Fourier transform infrared spectroscopy. Scanning electron microscopy revealed porous hydrogel morphology as well as the incorporation of drug in the polymer matrix. Swelling studies conducted in buffers, mimicking biological fluids, pH range 2.20-8.00 and temperature range 25-40 °C, showed pH- and temperature sensitive behavior of P(HEA/IA) hydrogels. Fast swelling reversibility of the hydrogels under oscillatory pH and temperature conditions make them attractive for self-regulated controlled drug delivery. The *in vitro* drug release study performed in a pH 2.20 and pH 7.40 showed pH- and temperature dependent release. The obtained results for P(HEA/IA) hydrogels indicate their good potential not only for colon-targeted drug delivery but also for long-term controlled release overcoming degradation of drug and possible side effects in acidic conditions of upper gastrointestinal tract.

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I/2

Mesoporous silica nanoparticles and their application in drug delivery

Sanja Milenković[1], Nikola Knežević[1,2], Aleksandar Djordjević[1], Danica Jović[1], Ivana Borišev[1]
[1]Department of Chemistry, Biochemistry and Environmental Protection, Faculty of Science, University of Novi Sad, Trg Dositeja Obradovića 3, 21000 Novi Sad, Serbia, [2]European University-Faculty of Pharmacy, Trg mladenaca 5, 21000 Novi Sad, Serbia

The aim of this research was to synthesise and characterise mesoporous silica nanomaterial and functionalise it with folic acid and phosphonate group in order to obtain targeted and specific nanodrug delivery system capable for delivery of hydrophobic drugs into tumor tissues. Furthermore, we investigated the possibility and conditions of loading of 9-aminoacridine, an intercalating agent, into nanomaterial pores by using fullerenol nanoparticles as pore-blocking agents. Physico-chemical results (IR, UV/VIS, SEM, TGA, BET, zeta potential and particles size distribution) suggest that we succeeded in obtaining stable, possible tumor-selective, pH-dependent nanodrug delivery system with high loading capacity.

I/3

Effect of a molecular weight on the release process from alginate microbeads

Jovana M. Ilić[1], Aleksandar S. Grujić[1], Mirko Z. Stijepović[1], Jasna T. Stajić-Trošić[1], Branko M. Bugarski[2]
[1]University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Njegoševa 12, 11000 Belgrade, Serbia, [2]University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Serbia

The scope of this paper is to investigate release kinetics of tracers from microbeads. Alginate microbeads were obtained by electrostatic droplet method. Three dye tracers with different molecular weight encapsulated in resulting alginate microbeads are released by diffusion of tracer through the pores of polymer network. The layoff curves show the impact of molecular size of used tracers on the diffusion rate from microbeads. Alginate microbeads were coated with chitosan in order to achieve the slow release of tracers. Chitosan has an impact on reducing the porosity of gel, which further led to lower release of tracers from microbeads.

I/4

Solid state characterization of maltose-embedded hemoglobin from porcine slaughterhouse blood

Katarina S. Bukara[1], Ivana T. Kostić[1], Vesna Lj. Ilić[2], Smilja B. Marković[3], Nenad Ž. Lazarević[4], Branko M. Bugarski[1]
[1]Department of Chemical Engineering, Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11060 Belgrade, Serbia, [2]Institute for Medical Research, University of Belgrade, Dr Subotica 4 POB 39, 11129 Belgrade 102, Serbia, [3]Institute of Technical Sciences of SASA, Knez Mihailova 35/IV P.O. BOX 377, 11000 Belgrade, Serbia, [4]Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Zemun, Belgrade, Serbia

The main aim of this research is defining optimal formulation of hemoglobin from porcine slaughterhouse blood with a great potential to be used as a huge source of hem iron in anemia treatment. After isolation and incorporation in maltose matrix, X ray diffraction confirmed successful phase transformation from solution to amorphous solid state form. Differential scanning calorimetry showed superior thermal properties of the maltose-embedded formulation in comparison with hemoglobin solution and Raman spectroscopy confirmed no major structural perturbations at the hem pocket imposed by the glass. The results confirm possibility of development, production and storage of stable hemoglobin with perserved functionality.

I/5

Influence of whey proteins addition on mechanical stability of biopolymer beads with immobilized probiotics

Nataša Obradović[1], Tanja Krunić[1], Ivana Damnjanović[1], Ana Jenić[2], Marica Rakin[2], Marko Rakin[2], Branko Bugarski[2]
[1]University of Belgrade, Innovation Centre of the Faculty of Technology and Metallurgy, Karnegijeva 4, 11120 Belgrade, Serbia, [2]University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11120 Belgrade, Serbia

The aim of this study was to analyze influence of whey proteins addition on modulus of elasticity of Ca-alginate beads and cell survival during the whey fermentation process. Mechanical stability of beads was analyzed at 30% of bead's deformation using Universal Testing Machine (AG-Xplus). The fermentation was carried out with probiotic starter culture ABY-6 until pH=4.6. The results indicate that the addition of whey proteins in alginate solution during immobilization process increases modulus of elasticity of the beads after fermentation in comparison with alginate beads without proteins and extends the shelf life of products through improving the viability of probiotics.

I/6

Optimization of chitosan gel preparation for supercritical impregnation of thymol

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Supercritical solvent impregnation process was selected for thymol incorporation into chitosan gels, for developing medically applicable solvent-free materials.

Chitosan hydrogels, prepared with cross-linkers, were converted to acetogels and subsequently dried with supercritical CO_2 or air. Morphology of obtained dry gels was analyzed by SEM and BET methods. Gels were impregnated with thymol in a high pressure view cell using supercritical CO_2 at 15.5 MPa and 35 °C during 24 hours.

The influence of the cross-linkers and drying method on the gel morphology and thymol impregnation yields was discussed. The highest impregnation yield was obtained for aerogel cross-linked with formaldehyde (11.30%).

II/1

Effect of surface modification on corrosion behavior of Mg-based implants

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In recent years, considerable attentions have been given to the Mg alloys as a biodegradable implants due to their good biocompatibility and mechanical properties. In this study, effect of surface modification on mechanical properties, degradation behavior and biocompatibility of Mg-AZ91D alloy were investigated. The corrosion behavior of this alloy was investigated by polarization tests and immersion tests. The mechanical properties were analyzed by using 3-point bending tests. The results showed that bending strength decreased by increasing the sintering time and temperature. Moreover, in vitro corrosion tests in DMEM proved that corrosion rate of surface modified samples were decreased by increasing the sintering time from 60 to 180 min while increasing sintering time from 180 to 300 min. has negative effect on corrosion rate.

II/2

Mechanical properties of micro-scale porous surfaces for Mg-based implants

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In this study, AZ91D magnesium alloys powders were compacted and heat-treated under various pressures, temperatures and times to manufacture plates with controlled porosity and micro-textured surface. The main objective was to obtain optimum pressure, temperature and time to achieve necessary porosity levels and strength. Results showed that compaction pressure slightly increases the bending strength of plates as well as their porosity. However, the bending strength of samples decreases as sintering time and temperature increases. Additionally, having the same hardness values shows that the heat treatment process was successful.

II/3

Plasma surface modification of chitosan films to control biocompatibility

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Plasma surface modification of biopolymers is a promising approach to develop the desired surface properties for various biomedical applications. This work is aimed to study the effect of DC discharge plasma modification of chitosan films on its surface properties, chemical structure and cell affinity. Contact angle measurements, XPS and SEM shows that in spite of the similarity of the observed processes, such as surface hydrophilization, etching and oxidation, the contribution of each process significantly depends on the initial chitosan characteristics. The effect of film plasma modification on their ability to support attachment and growth of animal cells was tested using mouse fibroblasts and human mesenchymal stem cells.

II/4

Hemolytic, antimicrobial and histological analysis of nanocomposite biomaterials based on HAp and polymers

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In some cases in oral and maxillofacial surgery, bone regeneration is required in large quantities. Synthetic composite biomaterials based on hydroxyapatite and polymers represent materials that can be used as substitutes to the natural bone tissue and bone grafts. In this work, we have investigated hemocompatibility, antimicrobial activity and post implantation effects analyzed on histological samples on animal models, of nanocomposite materials HAp, HAp/Ch and Hap/Ch/PLGA. We have found these materials to be non- or slightly hemolytic, that they show some antimicrobial properties, and also stimulate bone formation post implantation in the artificially made defects of the jaw bone in experimental animals.

II/5

Electrophoretic hybrid hydroxyapatite/graphene coatings on titanium

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The aim was to explore implementation of graphene sheets as reinforcement to hydroxyapatite (HAP) for biomedical applications. The hybrid silver/hydroxyapatite/graphene (Ag/HAP/Gr) coatings on Ti were obtained by using the electrophoretic deposition process. Incorporation of Gr was verified by Raman spectroscopy, X-ray diffraction, Fourier transform infrared spectroscopy, thermogravimetric analysis and X-ray photoelectron analysis. Bioactivity was verified through appearance of newly formed apatite layer in simulated body fluid with enhanced corrosion stability, as evidenced by EIS measurements. The Ag/HAP/Gr coatings were classified as non-cytotoxic against healthy peripheral blood mononuclear cells (PBMC), and exhibited strong antibacterial activity against *S. aureus* and *E. coli*.

II/6

Processing and properties of bioceramic materials based on hydroxyapatite doped with ions of magnesium and copper

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This study is aimed at improvement of hydroxyapatite features by optimized and simultaneous doping with magnesium and copper ions. Magnesium stimulates proliferation of stem cells and prevents possible risk factors for osteoporosis, while copper has potential antimicrobial ability. Hydrothermally synthesized powders, with different Mg amount and same copper content, were sintered to the form of controlled pours compacts. The obtained powders and bioceramics were characterized by XDR, SEM, EDS. The results indicated that magnesium presence had influence on particle size and crystallinity of initial powders, phase composition, microstructure and mechanical properties. The antimicrobial ability of powders was confirmed.

II/7

Sintered bioactive glass-ceramics prepared from strontium containing polyphosphate glass

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This study has been focused on fabrication of bioactive glass-ceramics for bone regeneration applications. The parent $42P_2O_5$ •40CaO•5SrO •10 Na_2O•$3TiO_2$ (mol %) glass was prepared by standard melt-quenching technique and the glass powder (< 0.048mm) compacts (Ø 10mm) cold pressed at 35 MPa were sintered at T = 620-680^{0}C for t = 1-3 h. The crystallization and sintering behavior of glass powder was determined by DTA and HSM methods. The phase composition and microstructure of sintered samples were examined using XRD and SEM. Low-crystallinity glass-ceramics containing bioactive phosphate phases β-$Ca_3(PO_4)_2$ and $Ca_2P_2O_7$ was fabricated.

III/1

Early fracture healing in ovariectomized rats femur helped with alfacalcidol and platelet-rich plasma on bio-oss carrier

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Alfacalcidol is widely used in the postmenopausal osteoporosis treatment because of the effect on bone strength and fracture prevention. Aim of this study was to examine the local effect of alfacalcidol in early healing process in artificially created defects of osteoporotic rat femur. Osteoporosis was induced by ovariectomy. In experimental group defects were filled with alfacalcidol and platelet-rich plasma on Bio-Oss as carrier while in control groups defects were without vitamin or left empty. Two weeks later in experimental group is seen less degradation of the implanted material and delayed regeneration. This effect can be assigned to the alfacalcidol action.

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III/2

Fabrication and characterization of electrospun PCL/PHBHHx fibers

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Myocardial infarction is one of the leading causes of death in western countries. The aim of the present work was the fabrication of a cardiac patch via electrospinning technique. Poly(ε-caprolactone) (PCL) was blended with poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) (PHBHHx) at ratios 30 and 70 w/v PHBHHx to improve cytocompatibility and hemocompatibility of the scaffold. Uniform and smooth fibers were obtained for all blends and comparable mechanical properties for PCL and PCL/PHBHHx 70/30 were achieved. *In vitro* cytocompatibility studies of PCL/PHBHHx fibrous mats demonstrated that the developed cardiac patches promote adhesion and proliferation of C2C12 and are therefore promising scaffolds for cardiac tissue engineering.

III/3

Antibacterial activity of a new clay-TiO_2 nanocomposits on gram positive and gram-negative bacteria

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Nanotechnology has gained a great deal of public interest due to the needs and applications of nanomaterials in many areas of human endeavors such as industry, agriculture, business, medicine, public health amongst many others. In this research a new Titanium nanocomposite was synthesized and characterized. The nanocomposite, which synthesized is in proportion to the weight of Clay-TiO_2. The properties of this composition were examined by the FT- IR, XRD and SEM**.** The use of lightweight aluminum and Titanium alloys in these industries has grown considerably. Anatase TiO_2 particles in aqueous solution by hydrolysis of Titanium are prop oxide in an acidic environment. Since Titanium's compounds have biological properties, the anti-bacterial properties were studied on four Gram-negative and Gram-positive batteries, E. coli, Pseudomonas aeruginosa, Micrococcus, Staphylococcus aureus. The present investigation was aimed to production a new nanocomposite of TiO_2 and determination of the antibacterial activity of this nanocomposite toward E. coli and Pseudomonas aeruginosa as Gram-negative bacteria. Micrococcus, Staphylococcus aureus as Gram-positive bacteria in laboratory condition.

III/4

Synthesis, characterization, anti-tumor and antibacterial activities study of nano leaf CuO

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Copper is an important material because of its high electrical and thermal conductive. CuO is known as p-type semiconductors exhibiting narrow bond gaps and has been widely used as powerful heterogeneous catalysts. In the present investigation, we report a suitable method for synthesis of copper oxide nano particles. The nano particles copper powder have been prepared using $[Cu(NO_3)_2.6H_2O]$, as precursor. As prepared copper oxide nano particles was characterization by X-Ray diffraction measurements (XRD), scanning electron microscopy (SEM), and FT-IR. Optical absorption measured by UV-Visible spectroscopy is applied to characterize the novel CuO nano structure. This new nanoparticles showed antitumor activity against one kind of cancer cells that is Human adenocarcinoma (AGS) cells**.** Also the compound was tested against the bacterial species Staphylococcus aureus, Escherichia coli**,** and Micrococcus.

III/5

Evaluation of genotoxicity of (meth)acrylate polymers in HeLa cells by using alkaline comet assay

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(Meth)acrylate esters are widely used in the production of polymeric materials for medical and dental applications. However, they have been reported to induce genotoxicity in *in vitro* micronucleus and chromosomal aberration tests. The aim of our study was to evaluate the genotoxicity of six types of (meth)acrylate polymers in HeLa cells by using alkaline comet assay. The cells were treated with two concentrations (20 and 4 mg/ml) of extract of each polymer for 24 hours. DNA damage, measured by percent of DNA in tail and tail moment, was statistically significant increased in treated cells compared to negative control and the DNA damage was higher in cells treated with 20 mg/ml extracts compared to cells treated with lower concentration. According to data available in literature, genotoxic potential of these polymers can be caused by (meth)acrylate based monomeric residues which can be released by mechanical shearing, enzymatic degradation or due to incomplete polymerization. In conclusion, our study indicates that these polymers show genotoxic effect in HeLa cells and should be tested further to determine mechanism underlying genotoxicity.
Acknowledgement: This work has been supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Grant No 41017 and 172062).

III/6

Structural, release and antibacterial properties of pH sensitive hydrogels based on 2-hydroxyethyl acrylate and itaconic acid with incorporated copper(II) ions

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In our study, the novel hydrogels based on 2-hydroxyethyl acrylate and itaconic acid with embedded copper(II) ions were prepared and characterized. Influence of hydrophilic monomer, itaconic acid, on hydrogel's properties was examined by varying its content. Fourier transform infrared spectroscopy confirmed expected structure of P(HEA/IA) hydrogels and successful copper(II) incorporation. pH sensitive swelling behavior was performed in wide range of pHs, at 37 ^{o}C. The swelling rate of the hydrogels was best described with second-order swelling kinetics. Swelling kinetic parameters were determined as well, and the fluid transport mechanism. The study of copper(II) release from P(HEA/IA) hydrogels was tested *in vitro* conditions, at pH 7.40 and 37 ^{o}C. The release profiles have shown a two-phase exponential profile, with fast initial phase, followed by a much slower release rate. The antibacterial assay with *Staphylococcus aureus* revealed excellent inhibiting activity of Cu(II)/P(HEA/IA) hydrogels. Examined hydrogels demonstrated suitable properties for biomedical applications, especially in wound healing and tissue regeneration.

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IV/1

Investigation of Fe_3O_4@cyanuric chloride supermagnetice nanoparticles effects on physical properties of flexible polyurethane foam nanocomposites

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In this paper, Fe_3O_4 were prepared via co-precipitation of Fe^{2+} and Fe^{3+} with ammonium hydroxide. Then surface modification of magnetite nanoparticles carried out by using direct functionalization with cyanuric chloride.

Finally, different concentrations of prepared MNPs (Fe_3O_4@Cyanuric chloride) were used for the synthesis of nanocomposites via one-shot method. The outcome of TGA displayed that thermal stability of polyurethane nanocomposite foam was improved by incorporation of Fe_3O_4@Cyanuric chloride. Additionally VSM result showed increasing in super paramagnetic behavior of PU nanocomposites by addition of Fe_3O_4@Cyanuric chloride. Also, SEM images confirmed the uniformity of the foam structures and decreasing in pore sizes.

IV/2

Preparation and characterization of polyurethane rigid foam nanocomposites by incorporation of magnetic core-shell Fe_3O_4@APTS/ 2-Chloropyridine nanoparticles

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Magnetic nanocomposites were prepared by incorporation of Fe_3O_4@APTS/ 2-Chloropyridine nanoparticles in polyurethane rigid foams. Fe_3O_4 NPs was synthesized via co-precipitation. Then, APTS-MNPs were prepared. Consequently, we coupled the 2-chloropyridine with the APTS-MNPs. The aim of this work was the formation of hydrogen bond between amino groups of Fe_3O_4@APTS/ 2-Chloropyridine with the urethane groups in order to improve of magnetic and thermal properties of the nanocomposites. The results of TGA showed an increasing in thermal stability of foam and SEM images showed the uniformity of the foam structures and decreasing in cell sizes. Also, the resultant nanocomposites have shown superparamagnetic behavior.

IV/3

The synthesis of micelle-templated mesoporous metal carbonates and metal oxides

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We developed a new synthesis approach for carbonates and oxides of cobalt, zinc and magnesium with micelle-templated pore structure. The synthesis of these films relies on triblock-copolymers as pore template and a new type of precursor formed by chemical complexation of a metal nitrate with citric acid. This precursor decomposes readily into an amorphous carbonate with templated pore structure. The final metal oxide is obtained after calcination at elevated temperatures under preservation of the pore system. The decomposition behaviour of the precursor as well as morphology, crystallinity and composition were analysed using TGA, SAXS, SEM, TEM, FTIR and XRD.

IV/4

The influence of synthesis parameters on physicochemical properties of hydrothermally/solvothermally derived cobalt ferrite nanoparticles

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In recent years spinel ferrite nanoparticles have attracted attention due to their potential applications in optics, electronics, ferrofluids, biomedicine, recording media, etc. Among them, cobalt ferrite ($CoFe_2O_4$, CFO) has often been investigated because of its high coercivity, moderate saturation magnetization, large magnetocrystalline anisotropy, large magnetostrictive coefficient, chemical stability, and mechanical hardness.

In the present work the CFO nanoparticles were prepared using hydrothermal and solvothermal methods in which the synthesis parameters such as pH and temperature were examined. The obtained powders were characterized by X-ray powder diffraction (XRD), transmission electron microscope (TEM), Fourier transform infrared spectroscopy (FT-IR) and vibrating sample magnetometer (VSM). The results show that pH influences the formation and growth of CFO phase. Additionally, by controlling the pH magnetic properties of CFO nanoparticles can be effectively tuned. It was observed that the growth of particles, as well as their morphology, is also affected by the synthesis temperature; however, hydrothermally prepared particles were in all the cases fairly agglomerated. In order to overcome this, the synthesis media was changed and the oleic acid was used as surfactant. For solvothermally particles prepared without the oleic acid the agglomerated nanoplatelets with a crystallite size of about 19 nm were obtained. However, the addition of oleic acid decreases the size of the CFO nanoparticles and changes their morphology. At critical concentration (0.25 M) the spherical particles of about 6 nm were obtained. As determined by FT-IR the particle-size control was achieved by bridging bidentate interactions between the oleic acid molecules and the metal atoms on the surface of the nanoparticles. VSM measurements revealed that magnetic behavior of the CFO nanoparticles can be changed from ferrimagnetic to superparamagnetic by controlling the oleic acid concentration.

IV/5

Fullerene C_{60} dimer oxides

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The aim of this work was to synthesise and characterise dimeric fullerene oxides ($C_{120}O_n$) obtained from fullerene C_{60}. C_{60} bromination was performed in two ways: with and without a catalyst. Thermal decomposition of obtained bromine derivatives led to formation of $C_{120}O_n$. $C_{120}O_n$ was extracted and characterised by infrared spectroscopy (IR) and thermogravimetric (TGA) analysis. Characteristic IR absorption peaks at 527, 576, 1181, 1429 cm^{-1} indicate that native C_{60} cage remained intact in $C_{120}O_n$, while the presence of symmetric ether bond was confirmed by peak at 1033 cm^{-1}. TGA results of $C_{120}O_n$ indicate the occurrence of changes in structure at 157.5°C.

IV/6

Photocatalytic behavior of nanostructured systems based on Ag&ZnO synthesized by solvothermal method

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Nanostructured systems of ZnO with silver (ZnO&Ag) were synthesized by solvothermal method from zinc nitrate hexahydrate ($Zn(NO_3)_2 \cdot 6H_2O$) and silver nitrate ($Ag(NO_3)$) as precursors. Materials obtained were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscopy (TEM). Moreover, the photocatalytic activity was studied. The results verify the viability of synthesized ZnO&Ag nanocomposites for environmental applications.

The best results (pollutant removal > 99 %) are obtained for samples synthesized at intermediate times, higher ratios Ag^+/Zn^{2+} and in the presence of CTAB, which controls the final morphology of nanostructures and the dispersion thereof, critical parameters for system properties.

IV/7

Release profiles of a new quinolone derivative from mesoporous silica materials

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The aim of this study was the synthesis of MCM-41 and amino functionalized MCM-41 and the use of these materials in the release of a novel fluoroquinolone. MCM-41 was successfully synthesized using cetyltrimethylammonium bromide as a structure directing agent and tetraethyl ortosilicate as a silica source in aquous ammonia medium at ambient temperature. For the functionalization reaction, MCM-41 was grafted with (3-aminopropyl)triethoxysilane by post-synthesis method. The properties of the obtained materials were determined using HR-TEM and FT-IR. The results show that the functionalization slows down the release kinetics of the fluoroquinolone.

V/1

Helically coiled carbon nanotubes as nanomechanical oscillators

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We investigate carbon nanotubes oscillators with two kinds of end constraints, cantilevered and bridge. Considered are nanoresonators constructed as a part of helically coiled or straight single wall carbon nanotubes. Elastic constants for all atoms of oscillators are evaluated numerically from Brenner interatomic potential. Frequencies and nodal displacement vectors are obtained by solving eigenproblem of the dynamical matrix. Natural frequency dependence on geometrical parameters of nanotubes is found. Helically coiled carbon nanotubes oscillators have lower natural frequencies than those constructed from the straight ones, and their vibration are specified by tubular and helical geometrical parameters. Oscillators made from carbon nanotubes can be used as nanosized mass sensors by measuring the frequency shift caused by the attached mass. Frequencies of helically coiled and straight carbon nanotubes decrease with a tight attached mass, but the variations pertain to the different ranges. Natural vibrations of nanotube resonators are also sensitive to the type and intensity of deformation.

V/2

Electronic nature of the low-temperature anomalies of specific heat in carbon nanotubes

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The low-temperature behavior of specific heat *C(T)* in disordered carbon nanotubes strongly depends on their structure. The nature of the low-temperature peculiarities of *C(T)* cannot be explained only by phonon contribution. We have calculated electron contribution to specific heat taking into account the multiple elastic electron scattering on impurities and structural inhomogeneities of short-range order type. We have described the low-temperature anomalous behavior of specific heat in disordered CNT and shown that this behavior may have the electronic nature and may be associated with electrons involved in structure restructuring of nanotubes which takes place when temperature rises.

V/3

Carbon nanotubes based active area of field effect transistors – basic analytical models

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In this paper, the new basic analytical models of Carbon Nanotubes based active are of Field Effect Transistors are proposed. At the very beginning, Carbon Nanotubes and their characteristics are discussed. Possibilities for Carbon Nanotubes implementation in standard electron devices – Transistors, are considered. Transistor's channel can be made of such nanotubes. This solution is very new and modern, but it is not well known and thus it is still being investigated. Basic analytical models for carriers' mobility and current-voltage characteristics for the Field Effect Transistor with Carbon Nanotubes based channel, are developed. These models include many relevant parameters and have a high degree of accuracy. They describe complex physical processes, but their application is very simple. At the same time, presented models are modular, so they can be easily examined and eventually changed – improved. The results of the simulations performed according to these models are in good agreement with those available in the literature.

V/4

Investigation of Risken–Nummedal–Graham–Haken instabilities in quantum cascade lasers

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We theoretically investigate a possibility to produce short mid-infrared pulses, being motivated in our study by the evidences that certain quantum cascade lasers (QCLs) exhibit features of Risken–Nummedal–Graham–Haken (RNGH) instabilities at low excess above lasing threshold. We show that under certain conditions, QCLs are capable of producing regular self-pulsations, yielding optical pulses as short as a few picosecond. We show that induced grating of medium polarization explains the low RNGH instability threshold in QCLs, without evoking for an ambiguous assumption of previous theories about a built-in saturable absorber and Kerr-lensing effect in the ridge waveguide of QCL.

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V/5

First principle calculation of phonons and electron-phonon interaction in graphene

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Density Functional Theory (DFT) is a quantum mechanical method used in physics and chemistry to describe structure of materials. Our research employs DFT for calculations of properties of 2D carbon honeycomb lattice, graphene. The focus of the research is on the phonons and electron-phonon coupling in doped graphene. Vibrational frequencies, phonon displacement patterns at the Brillouin zone center are calculated for the lithium intercalated graphene (LIG). Also electron-phonon coupling constant and superconducting critical temperature were studied, as well as methods for enhancing superconductivity of LIG. We show that the electron-phonon coupling constant can be significantly enhanced and critical temperature of LIG can be augmented up to 30K.

DFT calculations are performed using computational resources at Johannes Kepler University, Linz, Austria. This work was supported by the Serbian Ministry of Education, Science and Technological Development under projects OI 171005. This research is also supported by Qatar National Research Fund, cycle seven, (QNRF) under grant number NPRP 7-665-1-125.

V/6

Wake effect in the interaction of slow correlated charges with supported graphene due to plasmon-phonon hybridization

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The inter-particle interaction energy and the total stopping power for a correlated motion of two point charges that move above supported graphene at a speed smaller than the graphene Fermi speed are theoretically investigated. The slowly moving charges excite low-frequency collective mode which survives the Landau damping in the region of the intra-band single particle excitations in doped graphene. We show that this mode gives rise to wake effect manifested in the oscillatory patterns in both the interaction energy and the stopping power when the charges move with their inter-particle axis pointing in the direction of motion.

V/7

Analytical and computational modelling for the study of magnetization response in nanoscale heterostructures envisioned for coming generation memory and processing applications

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The advance of materials preparation and nanolithography techniques has opened exciting opportunities for technological applications of nanoscale magnetic systems. Heterostructure nanopillars and nanowires enjoy considerable interest as basic functional elements of future devices, such as magnetic random access memory, racetrack memory, and spin-torque nano-oscillators. In this work, a simplified micromagnetic model is presented which captures the essential physics governing magnetization response of nanoscale heterostructures. Striking qualitative differences between the characteristics of single-phase and multilayer systems are obtained. The validity of the simplified model, which we anticipate shall be found useful for design analysis, is verified by all-inclusive micromagnetic simulations. Applicability and further extendibility of the analytical model are discussed.

VI/1

Minimal volume photoacoustic cell as a Helmholtz resonator

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Throughout experimental measurements of the photoacoustic (PA) response, using a minimal volume PA cell, resonant phenomena have been noticed at frequencies lower than expected due to the influence of measurement chain (microphone and amplifier frequency response). In this paper, an open-ended minimal volume PA cell is modelled as a Helmholtz resonator. Two theoretical models are proposed, but their electrical analogies as well, based on which acoustic resonant frequencies, is calculated. The influence of several factors on the resonant frequencies is investigated: the volume of the electret microphone (being the PA cell in this configuration), the sound propagation velocity through the air, the surface area of the microphone hole and the surface area of the sample mounting ring of the PA cell. It is shown that acoustic resonances present a plausible explanation of experimentally observed peaks at frequencies lower than 20 kHz.

VI/2

Optoelectronic and charge carrier hopping properties of small diameter boron nitride nanotubes

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We investigated optoelectronic properties of small diameter boron nitride (BN) nanotubes and charge carrier hopping properties between them, using density functional theory (DFT) calculations. Optoelectronic quantities were investigated through calculation of reorganization energies. Charge coupling was calculated applying full quantum mechanical treatment while Marcus theory was used for calculations of charge carrier hopping rates. Obtained results indicate significant differences between investigated types of BN nanotubes. With the increase in dimensions of BN nanotubes their optoelectronic properties are improving and charge carrier hopping rates are the highest for the largest BN nanotube investigated in this work.

VI/3

Modification of electronic and chemical properties of graphene by oxygen-containing functional groups – First principles study

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The presence of various defects affects the reactivity of graphene and boosts its performance in various applications. Using DFT calculations, we show how oxygen-containing groups modify the electronic and the chemical properties of graphene. The adsorption of H, OH and Pt on three models of reduced graphene-oxide (rGO) was investigated systematically and compared to the case of pristine graphene, to address catalytic and electrocatalytic properties of rGO. Higher surface reactivity and the link between the electronic structure of rGO and its chemisorption properties have been observed. The electronic structure of carbon atoms governs the reactivity of rGO.

VI/4

Photoisomerisation mechanism of novel molecular switches – a Theoretical Investigation

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Arilhydrazones present novel class of molecular switches, but the actual mechanism of their photisomerization is not fully understood. E and Z isomers of N'-[1-(2-hydroxyphenyl)etiliden]isonicotinoylhydrazide) and their deprotonated forms (dE and dZ) were optimized at cam-B3LYP/cc-pVTZ level. Electronic spectra were computed using TDDFT approach. Based on the comparison of the computed and experimental electronic spectra and the calculated energy barrier for rotation in the ground state, it was concluded that the process of photoisomerisation goes through several phases: deprotonation of the E-isomer, photoexcitation of dE, rotation of methyl and phenyl groups in the excited state, deexitation and protonation of the dZ-isomer.

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VI/5

Determination of paracetamol in pharmaceuticals by pulse perturbation of the Bray-Liebhafsky oscillatory reaction

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The Bray-Liebhafsky oscillatory reaction system being in different dynamic states may be used as the matrix for kinetic determinations of numerous species. The proposed kinetic method for determination of paracetamol in pharmaceuticals is based on the perturbations of the Bray-Liebhafsky oscillatory reaction being in the stable non-equilibrium stationary state near the bifurcation point. Proposed method relies on the linear relationship between maximal potential shift and the logarithm of added paracetamol amounts. The developed method is precise, selective and sensitive enough for the analysis of pharmaceuticals formulations having paracetamol.

VI/6

Application of multi-criteria decision making (MCDM) methods for biomedical materials selection

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The selection of the most suitable material, or combination of materials, is a time consuming process that requires knowledge from the area and a lot of experience. Constant development of new materials makes this process more complex day after day. Large number of established and newly developed materials with different properties necessitates the simultaneous consideration of many conflicting criteria. Selection of the most suitable material for a given application represents a multi-criteria decision making (MCDM) problem with conflicting and diverse objectives. New MCDM methods have been developed, and existing methods improved, showing that research in the decision-making is important and still valuable. This paper describes the application of relatively novel MCDM methods for selecting the most appropriate biomedical materials. Complete procedure was shown and mathematical approach was explained. Finally, list of potential materials (alternatives) were ranked based on the selected criteria, where the best ranked one presents the most suitable/optimal choice for that application.

VII/1

Representation of microstructure of artificially aged 6061 aluminum alloy using two different etching solutions

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In this paper the emphasis is placed on the type of the etching solution and what kind of microphotographs can be obtained by using this etchants. There were two types of solutions, 0.5% HF and Dix-Keller reagent both widely used for etching aluminum alloys. Samples were taken throughout the experiment, etched and investigated. Some intermetallics and phases were better revealed with the first solution, but by using Dix-Keller reagent most important microstructure was obtained. Sample artificially aged at 200 °C for 6 h revealed microstructure that shows considerable thickening of grain boundaries which can be ascribed to deposition of Mg_2Si phase. This microphotography was visual proof of artificial ageing and was consistent with obtained hardness values.

VII/2

Electrochemical and thermodynamic investigation of talloil diethylenetriamine imidazoline as corrosion inhibitor for carbon dioxide corrosion of mild steel

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The corrosion inhibition of mild steel in CO_2-saturated 3 wt. % NaCl solution by talloil diethylenetriamine imidazoline (TOFA/DETA imidazoline) was investigated using electrochemical impedance spectroscopy (EIS), potentiodynamic sweep (PDS), cyclic voltammetry (CV) and scanning electron microscopy (SEM). The potentiodynamic polarization study revealed that TOFA/DETA imidazoline is a mixed-type corrosion inhibitor with a predominant anodic effect. The addition of TOFA/DETA imidazoline decreased the corrosion current density for more than one order of magnitude and the inhibition efficiency was calculated to be around 94 %. The adsorption of TOFA/DETA imidazoline on steel surface is spontaneous and follows Langmuir adsorption isotherm.

VII/3

Anticorrosive epoxy/clay nanocomposites and nanocoatings

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The aim of this study was to analyze the impact of high surface area (750 m^2/g) nanoclay (Cloisite 30B) on the anticorrosive, mechanical and adhesive properties of epoxy resin and commercial epoxy coatings. The WAXD, SEM and rheological analyses indicated that nanocomposites with nanoclay content below 5 wt.% had high exfoliation degree, while above 5 wt.% crowding of clay particles appeared. Improved corrosion stability of nanocomposites was evidenced by EIS analyses, and dependent on clay dispersion. The mechanical (hardness, elasticity, impact resistance), adhesive (Cross-cut) and anticorrosive properties (salt spray) of clay modified epoxy primers and topcoats were improved.

VII/4

Impact of crankshaft material on the elastic line deformation of his main journal

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Complex shapes of crankshafts and working conditions have dictated the need to estimate elastic line deformation of his main journal, in order to increase the accuracy of job security evaluation of the crankshaft during use. Theoretical methods of calculating the elastic line of main journal to the crankshaft can't take in considerate the homogeneity of the material and the completeness. In the study it is received the crankshaft of a diesel engine, which influence coefficients are calculated by theoretical methods and experimental methods. Results show that the divergence for the crankshaft prepared by spheroid cast iron go up 1.85.

VII/5

Investigation on kinetics of hydrogen absorption by Zr-based alloys

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Hydrogen absorption in Zr-12wt%Ta and Zr-2.5wt%Nb3wt%Ta alloys at 873 K and 973 K, under the pressure of 1 bar, is investigated. In order to explain hydrogen absorption process, kinetic analysis is done using Chou model and solid state kinetic models. Hydrogen diffusion through zirconium is determined to be dominant rate controlling step and activation energy for this process in Zr-12wt%Ta alloy is calculated using both models. Preliminary results suggest that tantalum addition lowers the activation energy for hydrogen diffusion through zirconium. However, measurements at wider temperature range are needed in order to validate this conclusion.

VII/6

Thermally induced structural transformations of $Fe_{40}Ni_{40}P_{14}B_6$ amorphous alloy

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Ribbon-shaped samples of amorphous $Fe_{40}Ni_{40}P_{14}B_6$ alloy, prepared using melt spinning method, were examined in terms of thermal stability and thermally induced structural transformations. DSC measurements were conducted at four different heating rates (5-14^{o}C/min) showing stepwise thermal stabilization process at temperatures higher than 380^{o}C, including glass transition and crystallization. X-ray diffractometry revealed formation of α-Fe and γ-(Fe,Ni) crystalline phases after annealing at 340^{o}C for 30 min, followed by crystallization of $(Fe,Ni)_3(P,B)$ phase and transformation of α-Fe to γ-(Fe,Ni) and $(Fe,Ni)_3(P,B)$ phases with further annealing. Kinetic triplets corresponding to crystallization of each individual phase were determined.

VIII/1

Mechanochemical treatment – a new way in powder metallurgy diamonds tools technology

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Simplifying processes, as well as the proper selection of substrates can reduce the cost of production of engineering materials. Presented studies deal the powder metallurgy in the technology of diamond tools. Thus, conventional - wet (energy-consuming, multi-stage) method has been replaced by an ecological mechanochemical synthesis realized through high-energy ball milling process. The appropriate selection of reagents as well as parameters of mechanochemical treatment gave the materials with desired characteristics, which may successfully be used instead of commercial metallic powders.

The study is supported by the Polish Ministry of Science and Higher Education, project DS/C-1/KWC/2013-14, DS-M/C-1/TS/2013 and by the EU, project POIG UDA-POIG-01.03.02-12-055/12-01.

VIII/2

Prediction of electrical resistivity values for binary alloys in Ag-Au-Cu-Pd system using artificial neural networks

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The results of prediction of electrical resistivity values for constitutive binary alloys in Ag-Au-Cu-Pd system using artificial neural networks are presented in this paper. The initial experimental data from literature was used for the analysis, performed by software package Peltarion Synapse. Obtained results are largely consistent with experimental data, with average value of disagreement of about ±5% for the tested binary systems.

Keywords: neural network, binary alloys, electrical resistivity.

VIII/3

Train brakes for high speed trains

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The scope of this paper is to show the advantages of the fourth generation of friction materials in comparison to the copper based materials that have been used for years in train breaking systems. These materials, made by powder metallurgy technologies, are defined by a stable coefficient of friction in all conditions of braking, with relatively small wear in comparison to the earlier used materials. All the tests were conducted on standard machines, prescribed by Italian standards. The exploitation investigations were carried out on the railway Belgrade-Bar- Belgrade, where the pads were made of this material and mounted on disc brakes of a passenger coach.

VIII/4

The magnetocaloric properties of the $Mn_{2-x}Fe_xP_{0.5}As_{0.5}$ (x = 1.0 and 0.7) compounds

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The magnetic investigation and calculation of magnetocaloric effect in the $Mn_{2-x}Fe_xP_{0.5}As_{0.5}$ (x = 1.0 and 0.7) compounds were the main aims of this work. The magnetic entropy changes were calculated by both the Maxwell and the Clausius-Clapeyron relations. It was shown that sample with x = 1 exhibits PM-FM transition of the first order while in Mn1.3Fe0.7P0.5As0.5 two magnetic transitions are observed: the second-order PM-FM transition and the first order FM-AFM transition. The high magnetocaloric effect near room temperature makes $MnFeP_{0.5}As_{0.5}$ real perspective for application in magnetic refrigeration technology.

IX/1

Chitosan-based materials for laser stereolithography

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The manufacturing of 3D objects by two-photon laser stereolithoghaphy allows spatially controlled solidification of liquid materials by photopolymerisation with a high accuracy and resolution. In this research, several chitosan modifications, such as allyl chitosan, chitosan-g-poly(vinyl alcohol) copolymers and chitosan derivatives with oligomeric substitutions have been synthesized and successfully used for hydrogel fabrication by two-photon stereolithography. The reported study was supported by RFBR, research project № 14-29-07234.

IX/2

Investigations on Methacrylate based polyHIPEs for possible application as separators in Li-ion batteries

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In situ electrolyte filled polymerized high internal phase emulsions (polyHIPEs) have been extensively investigated due to their potential application as separators in thin film Li-ion batteries. Because there are many requirements for such materials systematic investigations have been carried out. Therefore, new high internal phase emulsions (HIPEs) on the basis of Lauryl methacrylate and 1,12-Dodecanediol dimethacrylate with different amount of internal phase (75% up to 90%) and emulsifier (7.5 wt%, 15 wt%, 25 wt%) have been prepared. Rheological measurements have been used to characterize HIPEs as inks for thin film printing, and results show that all samples exhibit shear thinning behavior. Thermal an UV polymerized HIPEs were used for further characterization. Pore size (between 2-5 μm) and pore throat size (below 1 μm) were estimated by SEM images. Density and porosity were measured using pycnometry showing good agreement with the aimed values. Specific surface area was gathered by use BET-method, while thermal stability was investigated by means of DSC and TG showing stability of material up to around 200°C. Mechanical testing via compression measurements show that the Youngs modulus E decreases from 22.0 MPa for lowest porosity and 7.5 wt% of emulsifier to 1.3 MPa for highest porosity and 25 wt% of emulsifier. Finally, electrochemical impedance spectroscopy (EIS) measurements on in situ test electrolyte ($CaCl_2 \cdot 2\ H_2O$ in water) filled polyHIPEs have been performed in order to estimate the materials influence on electrical conductivity by calculating the MacMullin number. From the entire results one can see that there are a lot of parameters that can be tuned for materials final properties.

IX/3

Synthesis and characterization of biodegradable diblock and triblock copolymers based on PCL and PEO

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Biodegradable diblock and triblock copolymers based on poly(ε-caprolactone) and poly(ethylene oxide) were synthesized by ring-opening polymerization of ε-caprolactone using poly(ethylene oxide) and monomethoxy poly(ethylene oxide) as the macroinitiator and tin(II)-octoate as the catalyst. The copolymer structures were confirmed by ^{1}H NMR spectroscopy while molar masses were determined by GPC analysis. DSC and WAXS measurements were used to investigate the thermal properties and the degree of crystallinity. The morfology of copolymer films was analyzed by optical microscopy and AFM. The absorption properties were also tested. The obtained di- and triblock copolymers were evaluated for the preparation of micro- or nanospheres in controlled drug delivery system.

IX/4

Synthesis and characterization of modified pectin films intended for food packaging application

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High-methylated pectin was chemically modified in a cross-linking reaction using glycidyl methacrylate (GMA) in order to obtain a bio-based film. The films were characterized using FTIR spectroscopy and by determining water vapour transmission. The mechanical properties of the films were evaluated: tensile strength, elongation at break and Young's modulus of elasticity. FTIR spectra confirmed that the vinyl groups originating from the GMA were attached to the backbone of the polysaccharide chain. The results obtained from mechanical analysis and water vapour permeability revealed that the modified pectin films had satisfactory properties compared to the commercial synthetic materials used in food packaging.

X/1

Adhesion effects of ethylene-vinyl acetate copolymer (EVA) on optical fibers

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This research shows a new approach of examination of adhesion effects and forces between optical fibers and the adhesive during a tensile test. Solution of EVA in toluene was used like adhesive for optical fibers. The testing procedure consists of optical fiber characterization using optical microscopy, tensile test, SEM, and FTIR analysis. The sample of two connected fibers with EVA was subjected to tensile test to examine adhesion forces. Finite element modeling was used to simulate the behavior and stress distribution of the adhesion layer. This method can assist in adoption of a conclusion about the quality of adhesion.

X/2

Impact testing of kolon *p*-aramid fabrics with various types of reinforcement

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The six samples of polyurethane/*p*-aramid multiaxial fabric forms (Kolon fabrics) were analysed by high speed impact tester. Part of the samples was impregnated with 10 wt.% poly (vinyl butyral) (PVB)/ethanol solution. Several samples were modified with γ-aminopropyltriethoxysilane (AMEO silane)/ethanol solution. Pristine silica (SiO_2, SiO_2/PVB = 0.1) nanoparticles, tungsten disulfide (WS_2, WS_2/PVB = 0.01) nanoparticles and multiwalled carbon nanotubes (MWCNT, MWCNT/PVB = 0.01) were used as reinforcement for different samples. The results pointed out that Kolon/AMEO/PVB/1 wt.% sample produced 112% of improvement in the maximum impact force compared to the neat Kolon fabric sample. The above mentioned three kinds of reinforcement were put in order to improve the mechanical properties of the fabrics for the ballistic protection.

X/3

Mechanical properties of experimental composites containing a low-shrinkage monomer and monoacylphosphine oxide photoinitiator

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To determine mechanical properties of experimental composites based on novel low-shrinkage urethane-based monomer containing Lucirin photoinitiator.
Organic matrix consisted of 70:30 wt% of BisGMA/TEGDMA or FIT-852/TEGDMA. Photoinitiators were either CQ/DMAEMA (0.2:0.8wt%) or 1wt% Lucirin. 70% of barium-glass fillers were added to the matrix. Standardized samples (n=5/ group) were cured with a monowave or a polywave LED light. Vickers hardness and flexural strength were measured in 8 experimental groups.

FIT-852 showed inferior mechanical properties to BisGMA. Lucirin-based composites showed higher hardness and flexural strength than CQ-based composites. Polywave light gave comparable or better results than monowave, especially with Lucirin.

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X/4

Composite solid electrolytes based on $LiNO_2$

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Electrolytes with different type of charge carrier can find widely application in different using, e.g. sensors, batteries and others $LiNO_2$ is characterised by ionic conductivity ~ 10^{-4} S/cm at 180°C and more stable as compared with lithium nitrate and can be used as a component for synthesis of composite electrolytes. In this work composite solid electrolytes in the binary system $LiNO_2$ - A (A= CeO_2, SiO_2, SnO_2, Al_2O_3) were synthesized and their structural, thermodynamic and electrical properties investigated. The work was supported by the RFBR grant #14-03-31442.

X/5

Structure and properties of $BaTiO_3 – Ni_{(1-x)}Zn_{(x)}Fe_2O_4$ composites

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$NiZnFe_2O_4$ powder was prepared by auto-combustion method starting from nickel, zinc and iron nitrates. Barium titanate powder was prepared with same method using titanyl nitrate and barium nitrate. Multiferroic composites with formula $BaTiO_3– Ni_{(1-x)}ZnFe_2O_4$ (x = 0.3, 0.5, 0.7) were prepared from obtained powders of NZF and BT by mixing in planetary mill for 24h. Powders were pressed and sintered at 1170 ^oC for 4 h. Samples were characterized by XRD, Raman, SEM, IR, magnetic and electrical measurements. X-ray and Raman measurements confirmed the presence of NZF and BT phases. The microstructure indicated formation of polygonal and rounded grains.

X/6

Dielectrical Properties of Er_2O_3 doped $BaTiO_3$ Ceramics

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The samples of Er_2O_3 doped $BaTiO_3$ ceramics, prepared by conventional solid state procedure with dopant concentrations ranged from 0.01 up to 1.0 at%, were investigated in this paper. The specimens were sintered at 1320°C and 1380°C in an air atmosphere for four hours.

SEM analysis of $Er/BaTiO_3$ doped ceramics showed that in samples doped with a rare-earth ions low level, the grain size ranged from 20-40μm, while with the higher dopant concentration the abnormal grain growth is inhibited and the grain size ranged between 2-10μm.

Dielectric measurements were carried out as a function of temperature up to 200°C. The low doped samples, display the high value of dielectric permittivity (ε_r=2160) at room temperature. A nearly flat permittivity-response was obtained in specimens with higher additive content. Using a modified Curie-Weiss low the Curie-like constant C' and a critical exponent γ were calculated.

X/7

Effect of Y-doping on structure and properties of multiferroic $BiFeO_3$ ceramics

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Bismuth ferrite ($BiFeO_3$) exhibits ferroelectric and antiferromagnetic properties up to very high temperatures, and is, consequently, considered one of the most promising single phase multiferroic materials. Doping with Y^{3+} was tested in terms of improving electrical and magnetic properties. $Bi_{1-x}Y_xFeO_3$ was synthesized by auto-combustion method using urea as a fuel. Precursor powders were annealed, pressed and sintered. Powders and ceramic samples were characterized by XRD, SEM, Raman, electrical and magnetic measurements. X-ray diffractograms and Raman spectra showed transition from rhombohedral to orthorhombic structure at 10 % Y^{3+} content. SEM images indicated reduction in grain size with higher concentration of Y^{3+}.

X/8

The role of mechanochemistry in preparation of high dielectric constant and low-loss electroceramics

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High-energy ball milling process of solids often offers unique opportunities for the creation of value-added materials especially with perovskite structure. These studies are aimed to explain the advantages of the mechanochemical synthesis of polycrystalline ceramics with ultrahigh dielectric constants and low dielectric losses.

The results of comparison the syntheses' results using mechanochemical and high-temperature treatments are presented. Additionally, the influence of impurities from ball milling processes is considered.

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XI/1

Analysis of catalyst wetting efficiency influence on performances of industrial TBR for hydrodesulfurization and hydrodearomatization reactions

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Many industrial scale trickle bed reactors (TBR) operate at lower liquid superficial velocities (<0.5 cm/s) at which the catalyst particle are not completely wetted. This phenomenon of incomplete wetting has therefore received significant attention and numerous studies have addressed the influence of wetting on the overall rate, conversion/selectivity behaviour, and heat effects in TBR. The incomplete wetting conditions correspond to stagnant liquid pockets due to lower liquid superficial velocity which could cause significant influence on reactor performances. In this paper, several models for wetting efficiency in TBR on industrial level are examined and influence on reaction rate and reactor performance is discussed.

XI/2

Formic acid electrooxidation on carbon supported platinum catalyst with preferential plane orientation

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Pt-based nanocatalysts supported on Vulcan XC-72R carbon, were prepared by water-in-oil microemulsion method, with addition of various amounts of HCl in the water phase. Polyethileneglycol-dodecylether (BRIJ 30) was used as a surfactant, which influenced the Pt surface structure, along with HCl. Catalysts prepared with 0, 15, 25 and 35 % of HCl during the synthesis, were electrochemically characterised in 0,5 M H_2SO_4 using cyclic voltammetry and CO oxidation. Formic acid electrooxidation was examined on all investigated catalysts, in terms of their electrocatalytic activity and stability. Catalysts showed different behaviour in CV hydrogen region, and slight differences in formic acid oxidation mechanisms.

XI/3

Effect of electron acceptors on the kinetics of alprazolam photodegradation under simulated solar irradiation

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The aim of this work was to investigate the effect of electron acceptors on the photodegradation of alprazolam (benzodiazepine class of psychoactive drugs which is mainly used to treat anxiety disorders) under simulated solar irradiation in presence/absence of ZnO as photocatalyst. Liquid chromatography was used in the kinetics study of photodegradation. The degradation kinetics was studied in the presence of different electron acceptors such as O_2, H_2O_2, and $KBrO_3$. It was found that the efficiency of direct and indirect photolysis is much smaller than in presence of ZnO. Also, mentioned electron acceptors show different effects on efficiency of alprazolam photodegradation.

XI/4

Influence of calcination temperature of La-doped titania to the degradation efficiency of beta blockers in water suspension

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Titania based photocatalysts doped with 1% La have been prepared by the sol–gel route. The calcination temperatures of synthesized powders have been in the range from 450 to 750 ^oC. The structural and morphological properties of nanopowders have been related to the photocatalytic activity and tested in degradation of beta blockers. The UV induced photocatalytic activity of La-doped titania is compared with Degussa P25. The samples calcined at 450–650 ^oC, with anatase structure, have exhibited better photocatalytic performance than Degussa P25. The kinetics of degradation was monitored by HPLC–PDA technique, while mineralization was studied by TOC methods.

XI/5

Hydrogen storage in MgH_2 enhanced by addition of VO_2(B)

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Proven methods for reducing desorption temperature and speeding up sluggish kinetics of MgH_2 as a hydrogen storage material are mechanical milling and addition of various catalysts which also have positive effect on enhancement of absorption process. For this purpose, a small amount of VO_2(B) was added in MgH_2 powder and this mixture was milled mechanically in high energy ball mill. Produced composite was characterised using x-ray powder diffraction, scanning electron microscope, lasers scattering analysis of particle size distribution, differential scanning calorimetry and Sievert's method for hydrogen desorption analysis. Results show significant speeding up of desorption process.

XI/6

Desorption properties of MgH_2-TiO_2 nanocomposites for hydrogen storage

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In quest for designing an efficient hydrogen storage material based on MgH_2, we introduced anatase and rutile TiO_2 as catalyst for hydrogen desorption process. The aim of synthesizing MgH_2 + 10 wt. % TiO_2 composites by mechanical ball milling technique, was reduction of desorption temperature as well as altering desorption mechanism. Structural characterization of the composites was performed by X-ray powder diffraction, particle size analysis and scanning electron microscopy. Differential thermal analysis was used for the estimation of desorption temperature. Reduction of desorption temperature represents a proof of successful usage of TiO_2 as an effective catalyst for MgH_2.

XII/1

Magnetic macroporous copolymer for technetium-99 removal from contaminated groundwater

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A new magnetic macroporous copolymer was evaluated as sorbent for technetium-99 removal from aqueous solutions. Technetium (^{99}Tc+^{99m}Tc) was eluted from ^{99}Mo/^{99m}Tc generator (Vinča Institute) in the form of $NaTcO_4$. The pH-dependent TcO_4^- (pH range 1-8) adsorption was studied in aqueous buffer solutions, and various background solutions (deionized water, spring water, 0.01M, 0.1M and 1M KNO_3). The TcO_4^- adsorbed after 30min was higher than 95% at pH 4-5, while >99% of TcO_4^- can be effectively removed after 90min. The partitioning coefficient of TcO_4^- exceeded 26000 ml/g. Results indicated that magnetic copolymer can be effectively used for TcO_4^-separation from aqueous solutions.

XII/2

Technetium-99 removal by amino-functionalized macroporous copolymer

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Technetium-99 (^{99}Tc) is a significant component of nuclear waste and contributes to the long-term radiation risk, due to its high fission yield, relatively long half-life ($2.13x10^5$ years) and mobility in the environment. TcO_4^- removal from aqueous solution by macroporous copolymer functionalized with ethylene diamine and tetraethylene triamine was investigated by varying pH and sorption time. The radioactivity measurements were performed using standard radiochemical methods. TcO_4^- could effectively and rapidly be adsorbed over a wide range of pH (2-8) after 180min (>90%). Results of the research suggest that TcO_4^- can be effectively removed from aqueous solutions using this copolymer.

XII/3

The application of the polymer-zeolyte composite materials for the waste gas treatment

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The natural balance in the Earth's atmosphere is significantly influenced by the human emission of the combustion products, mainly carbon dioxide. The solution might be the construction of the membrane that is highly transparent to the carbon dioxide, but not transparent to the other gases commonly present in the waste gases. One of the feasible designs is dense, non-porous membrane, with zeolite particles dispersed in the polymer matrix. The possibility of application of polyether-b-amide as a polymer matrix was tested. For the inorganic component, four different zeolyte types with three different pore geometries were tested.

XII/4

Mn(II) adsorption onto commercial zeolite A: process kinetics and mechanism

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In this work, we have investigated phenomena during removal of Mn(II) from aqueous solutions using commercial zeolite A. Adsorption kinetics was examined at different temperatures and initial concentrations. Temperature was shown to be a determining parameter so that the rate limiting step up to 45 °C was intra-particle diffusion while at 55 °C ion-exchange governed the overall process rate. This was demonstrated by a previously developed kinetic model showing excellent agreements with experimental results. These studies have also shown that the adsorption process is followed by partial Mn(II) oxidation so that zeolite regeneration is possible only by a chelating agent.

XII/5

Dynamic adsorption of Rhodamine B from dilute aqueous solutions using negatively-charged membrane adsorbers

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A series of polyethersulfone membranes with integrated cross-linked poly(glycidyl methacrylate-co-2-acrylamido-2-methylpropane sulfonic acid) were synthesized using a combination of the traditional immersion precipitation process for making membranes and photopolymerization. Negative charges were introduced using AMPS as a reactive monomer. Presence of sulfonic groups was confirmed by FTIR-ATR spectra. Changes in membrane morphology as a function of AMPS concentration in the casting solution were investigated by SEM. Membrane charge was evaluated from streaming potential measurements using a specially constructed device. Dynamic adsorption of Rhodamine B was used to demonstrate effects of monomer concentration on the properties and separation performance.

XII/6

Organic/inorganic nanosilica support role in the recovery of terephthalic acid from Poly(ethylene terephthalate) wastes

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Poly (ethylene terephthalate) wastes received from used soft-drink bottles chemically recycled to terephthalic acid by using diethylene glycol (DEG) as the solvent and sodium hydroxide as the catalyst in the presence of organically modified nanosilica by g-glycidoxypropyltrimethoxysilane and diethanol amine (GDS) as the solid support. The performance of organically modified nanosilica were examined in detail and the results were compared with reaction in lack of GDS. Results showed that (GDS) delivered good performance as the reagent and solid support in depolymerizing of PET to the terephthalic acid. In the meantime, obtained results revealed that in the presence of NaOH (0.3 g), GDS (0.02 g) and PET: DEG molar ratios (1:3), TPA was obtained in high recovery yield (86%). In addition by exceeding the of GDS to 0.05g, the consumption of the solvent as well as reaction time required for complete glycolysis decreases up 62% and 98%, respectively.

XII/7

Quantification of basic dyes adsorption onto mesoporous silica SBA-15 using image analysis software

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The aim of this work is to examine reliability of image analysis method for quantification of three basic dyes (Basic Yellow 28, Basic Red 46 and Basic Violet 3) adsorption onto mesoporous silica SBA-15, using the Image-Pro Plus analysis software. Image analysis of the colored SBA-15 silica showed linear relationship between the color intensity and the dye concentration. The Image-Pro Plus software possessed the same sensitivity for prediction of dye concentration as the use of spectrophotometric analysis. The proposed method is a simple and relatively inexpensive alternative for the determination of basic dye concentration in contaminated water.

XIII/1

Study of the surface topography of thin-film conductive nanostructured coatings and the relative effects

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Due to the intensive use of organic optoelectronic elements in laser modulators, liquid crystal (LC) display and biomedical instruments the technology becomes relevant question of the design optimization. The advantages are the followings: optimization of the bias voltage, reducing the number of functional layers and other thin-film conductive contacts at the interface: solid-state substrate-liquid crystal. In this regard the problem to study the mechanism of the relief formation on the surface of different materials during their structuring by carbon nano-objects, mainly carbon nanotubes (CNTs), is quite timely.

We suggested that the using the nanostructured conductive coatings instead the high-resistive polyimide alignment layers in the spatial light modulators (SLMs) based on the liquid crystal mesophase permits to generate the key optical elements with good advantage. Our own steps in this direction are regarded to apply IR-laser deposition technique and following treatment of the CNTs with surface electromagnetic waves (SEWs). The obtained relief orients the LC-dipoles in vertical position, decreases the bias voltage and increase the laser strength. In addition, created a non-toxic orienting surface topography may be useful under the conditions to work with biological objects, such as red blood cells and DNA.

The presented results are partially supported by Russian Foundation for Basic Research Fond, grant No.13-03-00044 (2013-2015) as well as by FP7 program, Marie Curie International researchers exchange proposal "BIOMOLEC" (2011-2015).

XIII/2

Structural characterization of $BaTiO_3$ thin films obtained with spin coating and inkjet printing method

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Thin films technology became very popular research area in the last decade which led to development of various deposition methods. This research was focused on the comparison of different techniques for fabrication of $BaTiO_3$ thin films: spin coating and inkjet printing. Barium carbonate and tetrabutyl orthotitante were used as the precursors for synthesis of barium titanate sols. Subsequently different amounts of glycerol were added in systems to regulate the viscosity and improve the stability of sols. Spin coating is a straightforward technique in contrast to inkjet printing. In order to be printed sols have to meet a lot of requirements such as optimal values of viscosity, surface tension and particle size distribution. Aforementioned parameters were thoroughly examined and adjusted for printing process. Prepared $BaTiO_3$ sols were deposited on previously cleaned silicon substrates and annealed at 700°C in order to form crystalline phase. Structure of formed films was characterized by scanning electron microscopy, X-ray diffraction and Raman spectroscopy.

XIII/3

Synthesis, structural characterization and dielectric properties of barium titanate thin films

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At the end of 20th century microelectronics industry has experienced an outstanding progress. Performances and quality of computer components have been extremely improved, and this rapid progress is consequence of the development of new technologies and advanced materials. Nanostructured ceramic materials take very important place in microchip industry, especially thin films below one micrometer thick. Barium titanate is well known ceramic dielectric material that has the ability to be polarized, and store energy when exposed to external electric field. Thanks to its electric properties, barium titanate is used for production of capacitors and a good candidate for application in ferroelectric memory. In this research, barium titanate thin films were prepared by spin coating deposition technique from acetic precursor sols. Phase composition was characterized by X-ray diffraction and Raman spectroscopy. Morphology of thin films was analyzed by scanning electron microscopy and atomic force microscopy. Also, dielectric properties of thin films were characterized by LCD device, where sintering temperature influence on dielectric properties was inspected.

XIII/4

Graphene synthesis from solid precursor: the effect of annealing temperature and time

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In this paper we investigated the effect of annealing temperature and time on the quality of synthesized graphene films. Graphene films were formed by rapid thermal annealing (RTA) of thin nickel-cooper layers deposited on spectroscopic graphite as carbon source. Surface morphology of graphene films was investigated by atomic force microscopy. Raman spectroscopy study showed that mono layer graphene films are produced at lower annealing temperatures while annealing at higher temperatures resulted in formation of multi layer graphene films. Raman spectroscopy show as well that extended annealing time at higher annealing temperature can lead to formation of homogenous multilayer graphene films.

XIII/5

Relaxation of AC conductivity of isotactic polypropylene(iPP) after treatment in a solution of LiCl at a high positive electrical potential

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Isotactic polypropylene foils with different thickness were treated for 4 days in a saturated solution of LiCl at room temperature and the positive potential of 4 kV. Continuous surface measurements of AC conductivity of the treated films were carried out for a period of 7 days from the end of treatment. The treated samples show an increase in the specific conductivity compared to non-treated, also, it was observed a decrease in both components of the AC conductivity, conductance and susceptance, during the measurement of 7 days.

XIII/6

Manganese electrodeposition with the assistance of urea in high concentration

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Manganese coatings were electrodeposited on steel (AISI 4340) electrode by non-conventional method, with the assistance of 8 mol dm^{-3} of urea as a plating additive. The influence of urea on the electrodeposition of Mn was investigated by cyclic sweep voltammetry. The morphology of the coatings was studied by scanning electron microscopy (SEM), and their elemental composition by energy dispersive X-ray spectrometry (EDS). The results show that the presence of urea in the solution improves the characteristics of Mn deposits, i.e. their adhesiveness, porosity, compactness, and appearance. Furthermore, no carbon or nitrogen incorporation was detected in the deposits by EDS.

Keywords: urea, electrodeposition, Mn coating, morphology

XIV/1

Relating nanoscopic structure to macroscopic properties of liquid-phase exfoliated graphene

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Liquid-phase exfoliation (LPE) has emerged as a viable route for the mass production of graphene. However, little work has been done to relate the microscopic structure and morphology to macroscopic transparency and sheet resistivity. To relate these we have employed atomic force and scanning electron microscopy, optical transmission and electrical resistivity measurements to characterize various LPE films. We conclude that fragments of graphene sheets with lateral sizes of several nanometers enhance electrical conduction without reducing optical transmission, by filling voids between larger unconnected graphene flakes. Our work paves the way for optimization of LPE graphene for transparent conductors.

XIV/2

Atomic force microscopy and Kelvin probe force microscopy measurements of single and few layer grapheme

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We used atomic force microscopy (AFM) and Kelvin probe force microscopy (KPFM) to study topography and surface potential of graphene. Thicknesses of single- and few-layer graphene flakes as well as their surface potentials are determined from the AFM and KPFM measurements, respectively. Furthermore, KPFM is used to study how electrostatic doping influences the surface potential of passivated and non-passivated single-layer graphene samples in back gate configuration. We show that the surface potential increases with increasing the gate voltage, for both passivated and non-passivated samples. Also, we show that passivation of graphene leads to a more stable behavior of its surface potential when the gate voltage is varied.

XIV/3

AFM study of bacteria treated with graphene quantum dots

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In this paper we present the results of atomic force microscopy (AFM) study of bacteria treated with a new class of carbon nanoparticles - graphene quantum dots (GQD). Electrochemically produced GQD generate reactive oxygen species when photoexcited (470 nm, 1 W), and kill two strains of pathogenic bacteria, Staphylococcus aureus and Escherichia coli. Neither GQD nor light exposure alone, were able to cause oxidative stress and reduce the viability of bacteria. Morphological defects of bacterial cells were visualized by atomic force microscope, before and after inducing photoexcited GQD. Study of AFM images provides accurate data about changes in length, with and height, as well as RMS roughness of treated bacteria.

XIV/4

Determination of Nd-Yag laser parameters for metal threads cleaning in textile artefacts

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Textile samples with metallic threads from the collection of the Ethnographic Museum in Belgrade were subjected to Nd: YAG laser irradiation in order to determinate certain parameters for successfully and safely clean corrosion products without degrading the surrounding material. Application of conventional cleaning methods did not give the expected results, and the implementation of laser technology was the next step. The Nd: YAG laser energy 150mJ (1064 nm) and 50 mJ (532 nm) and pulse width 150 ps was used. The commercial, Thunder Art Laser was also used. Effects of the irradiated areas was investigated by optical and SEM microscopy and EDX analysis.

Key words: Laser cleaning, Nd:YAG laser, corrosion, metallic threads, textile.

XIV/5

Mössbauer study of $Hf_{0.5}Ta_{0.5}Fe_2$

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The pseudobinary Laves phase compound $Hf_{1-x}Ta_xFe_2$ is predicted to be ferromagnetic in the concentration range $0 \leq x < 0.3$, antiferromagnetic for $0.3 \leq x \leq 0.7$, and paramagnetic at around $x = 1.0$. In order to gain further insight into the magnetic properties of this compound, we have analyzed $Hf_{0.5}Ta_{0.5}Fe_2$. Results of Mössbauer spectrum measurements, combined with previous experiments conducted on $HfFe_2$ and $Hf_{0.75}Ta_{0.25}Fe_2$, provided the information regarding its intrinsic magnetic properties, e.g., the possible absence of magnetic moments of Fe atoms at 6h and 2a Wyckoff site in C14 structure at the temperature of 296 K.

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