



ACADEMY OF SCIENCES AND ARTS OF THE REPUBLIC OF SRPSKA



**XIII МЕЂУНАРОДНИ НАУЧНИ СКУП
САВРЕМЕНИ МАТЕРИЈАЛИ 2020**

**ПРОГРАМ РАДА
И
КЊИГА АПСТРАКАТА**

**XIII INTERNATIONAL SCIENTIFIC CONFERENCE
CONTEMPORARY MATERIALS 2020**

**PROGRAMME
AND
THE BOOK OF ABSTRACTS**

Бања Лука, 11. септембар 2020. године
Banja Luka, 11th September, 2020



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ОРГАНИЗАТОР НАУЧНОГ СКУПА
Академија наука и умјетности Републике Српске

СУОРГАНИЗАТОРИ
Alma Mater Europaеа
Технички универзитет Габрово

ПОКРОВИТЕЉ НАУЧНОГ СКУПА
*Министарство за научнотехнолошки развој,
високо образовање и информационо друштво*

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UNDER THE PATRONAGE OF

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THE SCIENTIFIC CONFERENCE HAS BEEN SUPPORTED BY

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ПРОГРАМ

13. МЕЂУНАРОДНЕ НАУЧНЕ КОНФЕРЕНЦИЈЕ „САВРЕМЕНИ МАТЕРИЈАЛИ“

Сходно тренутној епидемиолошкој ситуацију која влада услјед пандемије вирусом корона Конференција ће се, ове године, одржати на следећи начин:

- Уводни говори предсједника АНУРС-а академика Рајка Кузмановић, министра за наунотехнолошки развој, високо образовање и информационо друштво мр Срђана Рајчевића и предсједника Организационог и Научног одбора академика Драгољуба Мирјанића биће доступни у облику видео записа на сајту АНУРС-а www.anurs.org и сајту Конференције www.savremenimaterijali.info.
- Пленарна предавања биће презентована на web сајту www.savremenimaterijali.info у виду power поинт презентације или видео представљања рада,
- Постер презентације биће такође доступне на истом сајту са контакт емаил адресама аутора како би се могла остварити комуникација између аутора радова и Комисије за оцјену постер презентација,
- Књига апстраката и Програм рада биће доступни на сајту Конференције.
- Приступ свим презентацијама биће омогућен дужи временски период.

На овакав вид рада одлучили смо се како бисмо омогућили учесницима да представе резултате својих истраживања и упознају се са радом и резултатима истраживања својих колега, након чега могу остварити и лично комуникацију путем е-маил адреса која ће бити назначене. Радови у цјелини ће, као и претходних година, након рецензирања бити штампани у зборнику радова „Савремени материјали“ или часопису „Contemporary Materials“.

PROGRAMME

OF THE 13TH INTERNATIONAL SCIENTIFIC CONFERENCE CONTEMPORARY MATERIALS

According to the epidemiological situation around caused by corona virus pandemic this year's Conference is going to be held as following:

- Introductory speech of the president of ASARS academician Rajko Kuzmanović, ministry of scientific-technological development, higher education and information technology mr Srđan Rajčević and president of Organization and Scientific Board academician Dragoljub Mirjanić are going to be presented at the web site www.savremenimaterijali.info.
- Plenary speakers presentations are going to be available at the same web site in a form of power point presentation or audio presentation.
- Poster presentations are going to be available in the same form, with e-mail addresses to ensure communication among participants and members of commissions.
- The Book of Abstracts and Program will be presented at the Conference site.
- Access to all presentation will be possible for a longer period of time.

We have decided on this kind of work in order to enable the participants to present the results of their research and get acquainted with the work and research results of their colleagues, after which they can communicate in person via e-mail addresses that will be indicated. As in previous years, the papers will be published in the collection of papers "Contemporary Materials" or the journal "Contemporary Materials" after review.

ПЛЕНАРНА ПРЕДАВАЊА
PLENARY SESSION

1. Slavko Mentus
The role of batteries in near-future energetics
2. Stane Pejovnik, Genorio Boštjan
Lithium – boron system materials – current status
3. Momir Đurović
Energy for all: today and tomorrow
4. Nenad Filipović
SILICOFCM project: Computer simulation of hypertrophic cardiomyopathy
5. Plamen Tsankov
New Mono-SI, CDTE and Cigs grid-connected photovoltaic power plants in the technology park at technical university of Gabrovo, Bulgaria
6. Ljubomir Majdandžić
Ambition of the European green deal
7. Vojislav Mitić, Goran Lazović, Dušan Milošević, Elizabeta Ristanović, Dragan Simeunović, Mimica Milošević, Hans Fecht, Branislav Vlahović
Coronavirus trajectory and interval fractal method in Brownian motion
8. Duško Dudić
LDPE/ZIF-8 composite as a cathode in an electron battery
9. Predrag Dašić
Development of software systems for reliability analysis of the components technical system

ПОСТЕР ПРЕЗЕНТАЦИЈЕ POSTER SESSION

1. Olivera Klisurić, Ivana Marjanović, Predrag Ristić, Tamara Todorović, Predrag Vulić, Nenad Filipović
Structure, topology, photocatalysis and photoluminescence of 1D and 2D silver-based coordination polymers
2. Branko Škundrić, Rada Petrović, Jelena Penavin-Škundrić, Dragana Gajić, Darko Bodroža
Removal of hexavalent chromium CR (VI) from aqueous solution by adsorption onto kaolinite
3. Raul Turmanidze, Predrag Dašić, Giorgi Popkhadze
Review of the development of micro-drills for drilling small holes in modern composite materials
4. Silvester Bolka, Teja Pešl, Rebeka Lorber, Tamara Rozman, Rajko Bobovnik, Miroslav Huskić, Blaž Nardin
From recycled polypropylene to engineering plastic composite via addition of waste paper
5. Yueh-Ying Chou, Po-Yu Chen, Vojislav V. Mitić, Goran Lazović, Mimica Milošević, Jana Kotnik, Dušan Milošević
Bio-ceramics porosity and fractal nature
6. Suzana Apostolov, Borko Matijević, Gorana Mrđan, Đendi Vaštag
Application of chromatographic parameters in the assessment of amide derivatives' biological potential

7. Anja Mirjanić, Uroš Prah, Julian Walker, Oana Condurache, Andreja Benčan, Tadej Rojac, Marian Grigoras, Hana Uršič
Local piezoelectric and magnetic properties of (BIO.88Gdo.12)-FeO₃ ceramics
8. Violeta Nikolić
Observation of Fe₃O₄→α-Fe₂O₃ phase transformation at low temperature
9. Milesa Srečković, Aleksander Kovačević, Aco Janićijević, Suzana Polić, Zoran Nedić, Zoran Stević, Sanja Jevtić, Milovan Janićijević
Laser techniques and couplings with other techniques in contemporary problem solving in theory and practice
10. Biljana Zlatičanin, Branislav Radonjić
Modelling of phase equilibria in AlCu5Mg1 alloys
11. Marica Dugić, Branko Despotović, Tatjana Botić, Pero Dugić
Application of synthetic esters in formulations of industrial lubricants
12. Marija Riđošić, Katarina Crljenić, Mihael Bučko, Milorad Tomić, Jelena Bajat
Ultrasound assisted electrodeposition of Zn-Mn-Al₂O₃ nano-composite coatings
13. Marija Riđošić, Aleksandra Josipović, Milorad Tomić, Miomir Pavlović
The influence of the anodic oxidation on corrosion stability of Nb coatings produced by physical vapour deposition
14. Svetlana Stevović, Žarko Nestorović
The risks of nanotechnologies utilization in process of water use
15. Irena Havreljuk, Aleksandra Šinik, Tatjana Botić, Pero Dugić
Development and application of composite waterproofing materials

sured by standard protocol. Additional measurements of the sample dried under the lowered pressure were also performed. Results revealed that processes observed as a consequence of a thermal treatment has strong exothermic nature; the most intense DTA maximum is observed at $T = 289$ °C. Having on mind results of XRD and TEM analysis [1], as well that magnetite to hematite phase transformation presents exothermic process: $\text{Fe}_3\text{O}_4 + 1/4 \text{O}_2 = 3/2 \alpha\text{-Fe}_2\text{O}_3 + \Delta H$, $\Delta H = 115 \text{ kJ mol}^{-1}$ [2,3], observed exothermic process is ascribed to $\text{Fe}_3\text{O}_4 \rightarrow \alpha\text{-Fe}_2\text{O}_3$ phase transformation at low temperatures (< 300 °C) [2,3].
 such low temperature is observed for the first time, and still presents open question. The author is gratefully acknowledged Dr N. Cvjetičanin for thermogravimetric measurements.

Key words: magnetite, hematite, thermo-gravimetric analysis, phase transformation.

LASER TECHNIQUES AND COUPLINGS WITH OTHER TECHNIQUES IN CONTEMPORARY PROBLEM SOLVING IN THEORY AND PRACTICE

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Abstract: Problems of today, *pro et contra* of new breakthroughs in high frequencies and pandemics, seem to have called for even more complex correlations and couplings of the fields: science, empiria (practice), mass-media in mastering the best possible description of certain processes in joint efforts to get out of a situation where our Globe had come to. More than ever, a lot of multidisciplinary work is needed, but also narrowly specialized sophisticated knowledge of the fields in which research is conducted.

In broad and generalized approach of coherent radiation interaction with material, the boundary of more classical scattering / interaction approaches seems

to be lost, because the notion of stimulated processes and short-term pulses opened close areas in interaction with material (in a broad sense including bio-phenomena) and smeared the moment when living cells began to participate in optical recordings, and it is known that statistics from biological processes may solve traffic problems, etc.

In this paper, the interaction of materials with stimulated electromagnetic radiation, its results and the most accurate description of possible processes will be considered. By emphasising the optically visible, infrared and ultraviolet areas, some implementations of the rest of the electromagnetic spectrum and modulation of materials or their measurement possibilities will be sketched.

For selected examples of materials of various classes, their possible description of characteristics before and after interaction from the point of view of laser, thermal imaging, and other techniques will be considered, where records of induced acoustic or series of other coupled effects –like magneto-optical, electro-optical, etc. come to the fore. Selected theoretically more complex models with computer support will also be considered, as well as simple final formulas, which lead to relatively useful estimates in the outcome of the interaction during monitoring a particular output channel.

In the spectroscopic approach, parts of spectroscopies that have laser or stimulated sources included and in that way new or only improved spectroscopies opened, will be discussed.

In this regard, interpretations become very sensitive areas. The approach of the application of laser and non-laser techniques to materials in general, (e.g. to biomaterials, or to heritage objects) and defining the samples and measurements on selected objects or materials, as well as practice, theory, reality in the fields of cultural heritage, medicine or specific areas which include damages, useful destructive processes or explosive processes in the use of laser techniques again raises the issue of laser damages and their definitions.

Entering into the field of protection by the induction of laser breakdown or by the initiation of various processes, must have detailed knowledge of the main optical indicators / descriptors of the material, including the concepts of reflection coefficients, scattering, absorption, thermodynamic parameters, ignition point, particle size if the material is in the powder state and similar.

Key words: laser techniques, interaction, scattering, materials, description, visualization.