





National Center of Micro and Nanomaterials



National University of Science and Technology Politehnica Bucharest

Virtual International Scientific Conference on

"Applications of Chemistry in Nanosciences and Biomaterials Engineering" NanoBioMat 2024 – Winter Edition

27-29 November 2024



Book of Abstracts

Applications of Chemistry in Nanosciences and Biomaterials Engineering

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Program

The preliminary program will be published on the official webpage of the conference as well as on the webpage of AOSR on 20.11.2024, as well as in the TEAMS Class. The link for the TEAMS Class will be provided in due time, on or before 25.11.2024.

The topics for the conference include, but are not limited to:

- novel materials;
- surface chemistry;
- air and soil bioremediation;
- composite materials and biomaterials;
- applications of natural compounds and chemical products;
- nanomaterials and bionanomaterials for the controlled release of biologically active molecules;
- bionanoproducts for tissue engineering and regeneration;
- advanced techniques for material processing.

Deadlines:

1.	Registration:	27.10.2024
2.	Extended registration:	15.11.2024
3.	Abstract submission:	31.10.2024
4.	Extended Abstract Submission:	17.11.2024
5.	Acceptance Notification:	20.11.2024
6.	Final Program announcement:	25.06.2024
7.	Conference:	27-29.06.2024

Registration:

Registration should be done using the link: <u>https://nanobiomat.eu/registration/.</u> Registration is free for all students and postdoctoral researchers (or equivalent).

Abstract submission:

Abstract should be submitted in MS Word document using the link <u>https://nanobiomat.eu/registration/</u> on or before 17.11.2024. The abstract should be 150 - 300 words and it must contain the title, authors, and their full affiliation.



Scientific Committee

Acad. Maria ZAHARESCU, Romanian Academy (Romania) Prof. Ecaterina ANDRONESCU, UPB&AOSR (Romania) Dr. Vladimir BAULIN, URV (Spain) Prof. Aldo R. BOCCACCINI, FAU (Germany) Prof. Luigi CALABRESE, UniME (Italy) Prof. Joan CERDÀ, UIB (Spain) Prof. Carmen CHIFIRIUC, UniBuc (Romania) Prof. Eduard COROPCEANU, UST (Moldova) Prof. Ioana DEMETRESCU, UPB&AOSR (Romania) Prof. Anton FICAI, UPB&AOSR (Romania) Dr. Victor FRUTH-OPRISAN, ICF (Romania) Prof. Maria GAVRILESCU, TU Iași&AOSR (Romania) Prof. Oguzhan GUNDUZ, Marmara Univ (Turkey) Prof. Domenico LOMBARDO, CNR-IPCF Messina (Italy) Prof. Herbert Ryan MARINI, UNIME (Italy) Prof. Carlos MARQUES, UniStra (France) Prof. Lluis MARSAL, URV (Spain) Prof. Viorel NACU, USMF (Moldova) Prof. Ion NEDA, TU Braunschweig (Germany) Prof. Faik OKTAR, Marmara Univ (Turkey) Dr. Jörg OPITZ, IKTS (Germany) Prof. Lenuta PROFIRE, UMF Iasi (Romania) Prof. Marco RAGAZZI, Univ Trento (Italy) Prof. Serguei SAVILOV, MSU (Russia) Prof. Ze Xiang SHEN, NTU (Singapore)

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NanoBioMat 2024 – Winter Edition

Program (GMT +2, Bucharest time)

	Wednesday; 27.11.2024		Thursday; 28.11.2024		Friday; 29.11.2024	
8:00-8:30						
8:30-9:00						
9:00-9:30	- Registr	ation				
9:30-10:00	ine gisti					
10:00-10:30	OPENING C	EREMONY				
	2D transition metal carbides and nitrides (MXenes) and their biomedical applications. Yury GOGOTSI					
10:30-11:00						
	Harnessing Biogenic Nanomaterials for Sustainable Solutions: Innovations in Environmental Management, Healthcare, Industry, and Agriculture.		Session III Session IV	Section IV	Session VII	Soccion V/III
				Session IV	Session vil	36221011 111
11:00-11:30						
	Engineering Versatile Met	al-Based Co-Catalysts for				
11:30-12:00	Solar-toFuel Conversion.					
	Bo WI	ENG				
	Additive Manufacturing of Bio-aerogels with		Nanomaterials for the Regulation of Inflammation. Sergej TOMIC		Integrating environmental phyto-remediation with	
12 02 12 22	StructureCorrelated Thermal, Mechanical, and				biomass valorization for the recovery of some critical	
12:00-12:30	Biological Properties.				metals and energy by phytomining.	
	Shanyu ZHAO				Maria GAVRILESCU	
	Processing and Design of Materials		Intrinsically disordered peptides enhance			
12 22 12 22			regenerative capacities of bone composite		Hot Quantum Materials.	
12:30-13:00	for Bone Tissue	Engineering.	xenografts.		Klaas-Jan TIELROOIJ	
	Anton	FICAI	Havard J. HAUGEN			
13:00-13:30					CLOSING C	EREMONY
13:30-14:00		Lunci	1 lime			
14:00-14:30						
14:30-15:00						
15:00-15:30	- Session I	Section II	Session V	Session VI		
15:30-16:00		565510111				
16:00-16:30						
16:30-17:00						
17:00-17:30	Poster Sessions I	Poster Sessions II	Poster Sessions III	Poster Sessions IV		
17:30-18:00						



Wednesday, 27 November 2024			
08:00 - 08:30			
08:30 - 09:00			
09:00 - 09:30	Desistuation		
09:30 - 10:00	Registration		
	OPENING CEREMONY		
10:00 - 10:30	Chair: Ecaterina ANDRONESCU		
	LINK		
	Plenary SESSION I. Advanced Functional Materials		
	Chairs: Ridha DJE	LLABI; Anton FICAI	
	<u> </u>	INK	
	2D transition metal carbides and nitrides (MXenes) and their biomedical applications. Yury		
10:30 - 11:00	GOGOTSI		
	Harnessing Biogenic Nanomaterials for Sustainable Solutions: Innovations in Environmental		
11:00 - 11:30	Management, Healthcare, Industry, and Agriculture. Charles Oluwaseun ADETUNJI		
11:30 - 12:00	Engineering Versatile Metal-Based Co-Catalysts for Solar-to-Fuel Conversion. Bo WENG		
12.00 12.20	Additive Manufacturing of Bio-aerogels with StructureCorrelated Thermal, Mechanical, and		
12:00 - 12:30	Biological Properties. Shanyu ZHAO		
12:30 - 13:00	Processing and Design of Materials for Bone Tissue Engineering. Anton FICAI		
13:00 - 13:30			
13:30 - 14:00	LOIVE	TDREAK	
14:00 - 14:30	SESSION I. MATERIALS AND TECHNOLOGIES	SESSION II. TISSUE ENGINEERING AND	
14:30 - 18:00	FOR CIRCULAR ECONOMY	REGENERATIVE MEDICINE	
15:00 - 15:30	Chairs: Simina LAKATOS; Andrei Victor	Chairs: Christophe EGLES; Andreea-Teodora	
15:30 - 16:00	SANDU	IACOB	
16:30 - 17:00	LINK	LINK	
17:00 - 17:30	Poster SESSION I	Poster Session II	
	Chairs: Denisa FICAI; Luigi CALABRESE	Chairs: Vasile-Adrian SURDU; Sergei TOMIC	
17:30 - 18:00	LINK	LINK	

Thursday, 28 November 2024		
9:30 - 10:00	SESSION III. FOOD AND NATURAL	SESSION IV. MATERIALS FOR ANTICORROSIVE
10:00 - 10:30	COMPOUNDS FOR HEALTH	AND ENVIRONMENTAL APPLICATIONS
10:30 - 11:00	Chairs: Anca MAZARE; Ioana DEMETRESCU	Chairs: Gianluca VISCUSI; Roxana PITICESCU
11:00 - 11:30	LINK	LINK
11:30 - 12:00		
	PLENARY SESSION II. NANOBIOMATERIALS	
	FOR HEALTH	
	Chairs: Jorg OPITZ; Liliana VERESTIUC	
	LINK	
12:00 - 12:30	Nanomaterials for the Regulation of	
	Inflammation. Sergej TOMIC	
12:30 - 13:00	Intrinsically disordered peptides enhance	
	the regenerative capacities of bone	
	composite xenografts. Havard J. HAUGEN	



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13:00 - 13:30 13:30 - 14:00	LUNCH BREAK		
14:00 - 14:30 14:30 - 18:00 15:00 - 15:30 15:30 - 16:00 16:00 - 16:30 16:30 - 17:00	SESSION V. MATERIALS WITH ANTIOXIDANT, ANTIMICROBIAL, AND ANTICANCER PROPERTIES Chairs: Oguzhan GUNDUZ; Ovidiu OPREA LINK	SESSION VI. ADVANCED MATERIAL FOR SPECIFIC APPLICATIONS Chairs: Shanyu ZHAO; Victor FRUTH LINK	
17:00 - 17:30 17:30 - 18:00	Poster Session III Chairs: Cem Bulent Ustundag; Irina FIERASCU <u>LINK</u>	Poster Session IV Chairs: Sergiu COSERI; Serguei SAVILOV <u>LINK</u>	

Friday, 29 November 2023			
9:30 - 10:00	SESSION VII. SIMULATIONS,		
10:00 - 10:30	OPTIMIZATIONS AND USE OF ARTIFICIAL	SESSION VIII. NATURAL, GREEN AND BIOMIMETIC MATERIALS	
10:30 - 11:00	AND DESIGN	Chairs: Charles Oluwaseun ADETUNJI; Mihaela	
11:00 - 11:30	Chairs: Klaas-Jan TIELROOIJ; Graziella-	DONI	
11:30 - 13:00		LINK	
	Plenary SESSION III. MATERIALS FOR		
	QUANTUM AND ENVIRONMENTAL		
	APPLICATIONS		
	Chairs: Heiko FRANZ; Radu Claudiu		
	FIERASCU		
	Integrating environmental phyto-		
12:00 12:20	the recovery of some critical motals and		
15.00 - 15.50	chergy by phytomining Maria		
	GAVPILESCI		
	Hot Quantum Materials Klaas-Jan		
13:30 - 14:00	TIFL ROOLI		
	TILLIOOD		
14:00 - 14:30	CLOSING C	EREMONY - LINK	
	Chair: Ecaterina ANDRONESCU		



Wednesday, 27 November 2024

09:00-10:00 - Registration

10:00-10:30 - OPENING CEREMONY - LINK

Chair: Ecaterina ANDRONESCU

Ecaterina ANDRONESCU - President of the Scientific Committee

Doru DELION - President of the Bucharest Branch of Academy or Romanian Scientists

Tudor PRISECARU – State Secretary of the Ministry of Research, Innovation and Digitization, President of the Senate of The National University of Science and Technology POLITEHNICA Bucharest

10:30-13:00 – Plenary SESSION I. Advanced Functional Materials - LINK

Chairs: Ridha DJELLABI; Anton FICAI

- 10:30-11:00 2D transition metal carbides and nitrides (MXenes) and their biomedical applications. Yury GOGOTSI
- 11:00-11:30 Harnessing Biogenic Nanomaterials for Sustainable Solutions: Innovations in Environmental Management, Healthcare, Industry, and Agriculture. **Charles Oluwaseun ADETUNJI**
- 11:30-12:00Engineering Versatile Metal-Based Co-Catalysts for Solar-to-Fuel Conversion. Bo WENGAdditive Manufacturing of Bio-aerogels with StructureCorrelated Thermal, Mechanical, and
- 12:00-12:30 Biological Properties. Shanyu ZHAO
- 12:30-13:00 Processing and Design of Materials for Bone Tissue Engineering. Anton FICAI

13:00-14:00 - LUNCH BREAK

14:00 - 17:00 – SESSION I. Materials, Technologies and Devices in the Context of Circular Economy - LINK

Chairs: Simina LAKATOS; Andrei Victor SANDU

14:00-14:15 Ethanol photodegradation on noble metals-modified TiO₂ obtained by sol-gel method. **A. Ilie**, C. Anastasescu, L. Predoana, A. Rusu, S. Preda, D. Culita, I. Balint and M. Zaharescu



- 14:15-14:30Development of cellulose-based textile materials with improved surface properties.Kocaman, Semra Unal, Mehmet Burçin Pişkin, Cem Bülent Üstündağ
- 14:30-14:45 Impact of Bistability in Silicon Oil-Dispersed Ferroelectric Liquid Crystal Emulsion Systems for Data Storage Applications. **Ashok Chaudhary**
- 14:45-15:00 Improvement of new potential biomaterials and their characterization using techniques such as microscopy, spectroscopy, electrochemistry, chromatography etc. **Radu Nartita**, Florentina Golgovici, Daniela Ionita, Ioana Demetrescu
- 15:00-15:15 Nanonization Stratagems for Improving Innovative Extraction and Size Reduction of Fastidious Biomaterial and Its Physico-Chemical Characterization. Amutha K, Anitha C , Meena K, Thamizharasan
- 15:15-15:30 Three-dimensional Graphene Obtained by CVD Synthesis. **Cristina Antonela Banciu**, Ioana Ion, Delia Patroi, Gabriela Sbarcea, Virgil Marinescu, Marius Lungulescu, Adela Bara, Lucia Monica Veca, Florin Nastase, Anca Ionela Istrate
- 15:30-15:45 Nopal Cactus Mucilage as a Sustainable Corrosion Inhibitor for Bronze B66 in Saline Environments. **Malak Rehioui**, Hamid Erramli, Najat Hajjaji
- 15:45-16:00 Chitosan-based smart and versatile materials. **Raluca-Marieta Toma**, Ludmila Aricov, Anca-Ruxandra Leonties, Monica-Elisabeta Maxim and Aurica Precupas
- 16:00-16:15 Structural Insights into Wood Impregnation with Nanosilica Particles. Diana Floriana Fundeanu (Tălau), Anton Ficai
- 16:15-16:30 From biomass to value-added materials: The relevance of biochar and hydrochar in bioremediation processes and circular economy framework. **Emanuel Gheorghiţa Armanu**, Irina Volf
- 16:30-16:45Mechanical Properties of Poly(ethylene succinate) Thin Films Embedded with Chemically
Synthesized Copper Oxide Nanoparticles. Zoulikha Hafsi, Yasmina Khane, Abdelhalim Zoukel
- 16:45-17:00 Effect of the lithium ions insertion on the physico-chemical characterizations of geopolymers. **Mouna Sellami**, Maud Barre, Mohamed Toumi



14:00 - 17:00 – SESSION II. TISSUE ENGINEERING AND REGENERATIVE MEDICINE - LINK Chairs: Christophe EGLES; Andreea-Teodora IACOB

- 14:00-14:15 Dual-Responsive Hydrogel Biosensor Based on Hydroxyethyl Cellulose/Acrylamide-Nitrogen Doped Carbon Dots for Bacterial Detection. **Hebat-Allah S. Tohamy**
- 14:15-14:30 Production of chitosan-PVA coated vitamin E and ephedrine microparticles for the treatment of narcolepsy. **Asude Bilge Yakut**, Ayşe Betül Bingöl, Büşra Oktay, Cem Bülent Üstündağ
- 14:30-14:45 Ultrasound-assisted synthesis and characterization of hydroxyapatite/β-cyclodextrin composite as additive for tanning industry. Elisa Dumbravă, Ilaria Quaratesi, Petre Chipurici, Adrian Bercea, Yassin Zaki, Andrei Cucos, Miruna S. Stan, Genoveva Burca, Elena Badea
- 14:45-15:00 Assessment of Hyaluronic Acid and Melatonin's Efficacy on Bovine Tooth Remineralization: A Comparative in vitro Study with Well-Recognized Agents. **Aysenur Ertunc Demirci**, İbrahim Isildak
- 15:00-15:15 Fabrication and Characterization of 3D Printed SA/PVA/XG Composite for Wound Dressing Applications. **Emine Büşra Terzi**, Sümeyye Cesur, Oğuzhan Gündüz
- 15:15-15:30 Examination of the Effect of Electrospun Clay-Modified Polyvinyl Alcohol (PVA) Nanofibers Produced by Electrospinning on Wound Healing. **Sumeyye Kaplan**, Eslem Ekemen, Sumeyye Cesur, Oguzhan Gunduz
- 15:30-15:45 Simulation of dual loading of demineralized cancellous bone with active principles and bovine albumin. **Cobzac Vitalie**, Jian Mariana, Malcova Tatiana, Mariţoi Tatiana, Plamadeală Svetlana, Nacu Viorel
- 15:45-16:00 Vascular grafts obtained through the 3D printing technique. **Ioana Ghiață**, Isabella Nacu, Liliana Vereștiuc
- 16:00-16:15 Fabrication and potential of chitosan-graphene oxide scaffolds in neuroregenerative medicine. Andreea-Isabela Lazăr, Alexa-Maria Croitoru, Ludmila Motelica, Ovidiu Oprea, Roxana-Doina Trușcă, Denisa Ficai, Anton Ficai
- 16:15-16:30 Multilayered Biofunctional Scaffold: An Integrated Approach for Innovative and Effective Treatment of Diabetic Wounds. **Shhd Saraj**, Kaan Daniş, Esra Yüca Yilmaz, Pelin Pelit Arayici, Selcen Ari Yuka, İlhan Onaran, Oguzhan Gunduz, Cem Bulent Ustundag



- 16:30-16:45 Utilization of 3D Printed Carboxymethyl Cellulose, Pectin, and Polyvinyl Alcohol-Based Bio-Scaffolds in Wound Healing. **Ogulcan Yuksekdanaci**, Fatih Mehmet Yildiz
- 16:45-17:00 Characterization and Bioactivity Analysis of Doped and Loaded MCM-41 and MBGNs for Tissue Engineering. **Andreea-Luiza Mîrţ**, Denisa Ficai, Andrada-Ioana Damian-Buda, Qaisar Nawaz, Gabriel Vasilievici, Anton Ficai, Aldo R. Boccaccini

17:00 - 18:00 - Poster Session I - LINK

Chairs: Denisa FICAI; Luigi CALABRESE

- Effect of glucose, NaCl and urea on the interaction of quinizarin with SDS micelles. Mirela Enache, Ana Maria Toader, Izabella Dascalu, Petruta Oancea
- 2. Synthesis of (2E)-N-(4,6-dimethylpyrimidin-2-yl)-2-[1-(pyridin-2-yl) ethylidene] hydrazine-1carbothioamide. **Andrei Neguță**, Roman Rusnac, Aurelian Gulea
- Iron-containing catalysts obtained by sol-gel combustion for CO₂ hydrogenation. Sergey V. Klokov, Sergey I. Roslyakov
- Influence of Temperature and Immersion Parameters on the Strength Rate of Calcium Phosphate-Based Scaffold. Laura-Nicoleta Dragomir, Ştefania Stoleriu, Georgeta Voicu, Andreea Cucuruz, Cristina-Daniela Ghiţulică, Adrian-Ionuţ Nicoară
- Evaluation of scenarios for nutrient recovery from food waste and estimation of economic and environmental efficiency using Cost-Benefit Analysis. Ungureanu-Comăniță Elena-Diana, Țâbuleac Raluca Maria, Oprea Paula Sanzaiana, Cosbuc Ersilia, Gavrilescu Maria
- Antimicrobial Packaging Films Based on Cellulose with Food Additives. Gabriela Petrişor, Ludmila Motelica, Denisa Ficai, Ovidiu Oprea, Anton Ficai, Roxana Truşcă, Ecaterina Andronescu, Ariana Hudiţă and Alina Holban
- Zn(II), {Zn(II)Au(I)}, and {Zn(II)Ag(I)} complexes with Schiff base ligands: promising antitumor agents against breast and cervical cancer cells. Daniela C. Culita, Tania Zhivkova, Abedulkadir Abudalleh, Lora Dyakova, Teodora Mocanu, Augustin M. Madalan, Milena Georgieva, George Miloshev, Gabriela Marinescu, Radostina Alexandrova
- Synthesis and characterization of beta-TCP doped with gallium. Ioana-Sandra Serdaru, Georgeta Voicu, Adrian-Ionut Nicoara, Laura- Nicoleta Dragomir
- Phenoxypicramide Rearrangement as Phenoxazine Derivative. Rodica-Daniela Baratoiu-Carpen, Elena-Nusa Hristea, Petre Ionita



- 10. Investigating of toxicity of extracts from vegetative organs of the species Bryophyllum pinnatum (Crassulaceae). **Alice Maria Moise**, Emanuela Gheorghita, Robert Ancuceanu, Mihaela Dinu, Marilena-Viorica Hovanet, Cristina-Silvia Stoicescu, Ioana-Leontina Gheorghe, Dana-Andreea Neacsu, Adriana-Iuliana Anghel
- 11. Functionalized Hydroxyapatite Coatings by MAPLE: A Novel Approach in Bone Tissue Engineering. **Diana-Elena Radulescu**, Bogdan Stefan Vasile, Ionela Andreea Neacsu, Ecaterina Andronescu
- 12. Green Synthesis of Zinc, Magnesium, and Copper Oxide Nanoparticles Using Orange Peel Extract. **Denisa-Maria Radulescu**, Ionela Andreea Neacsu, Bodgan Stefan Vasile, Ecaterina Andronescu

17:00 - 18:00 - Poster Session II - LINK

Chairs: Vasile-Adrian SURDU; Sergej TOMIC

- Acoustic and Optical Analysis of Polyvinylpyrrolidone-K60 in Ethanol/Water Binary Mixtures. Applications in the synthesis of nanoparticles. Monica Maria Mincu, Florinela Sirbu, Dana Dragoescu, Cristina Munteanu, Ion Ion and Alina Catrinel Ion
- The influence of e-beam irradiation on polyaniline film used for gas sensing applications. Ana-Maria Popa, Andrei Stochioiu, Luiza-Izabela Toderaşcu, Oana Gherasim, Vlad-Andrei Antohe, Elena Mănăilă, Gabriela Crăciun, Gabriel Socol and Iulia Antohe
- Sensitive detection of ethanol in aqueous solutions using a plasmonic sensor. Andreea Ionescu, Ana-Maria Popa, Felicia Iacob, Vlad-Andrei Antohe, Gabriel Socol and Iulia Antohe
- Comparative Analysis of Cerium-Doped vs Cerium-Strontium Co-Doped Bioactive Glass: Improved Properties and Prospective Applications. Cezara-Marina Bolocan, Alexandru Anghel, Vasile Adrian Surdu, Roxana Trusca, Anton Ficai, Ecaterina Andronescu
- 5. Prospects for the use of carbon sorbent obtained from rice husk for the sorption of petroleum volatile organic compounds with their subsequent analysis by gas chromatography-mass spectrometry with thermal desorption. **Valentina Levkina**, Anastasia Antonova, Alexander Popov, Roman Novotortsev, Sergey Savilov
- Performant biofunctional dressings based on Aloe vera hydrogels. Mariana Chelu, Monica Popa, Adina M. Musuc, José M. Calderón Moreno
- 7. Utilizarea nanoparticulelor în țintirea celulelor canceroase și reducerea efectelor secundare ale chimioterapiei. **Guzgan Natalia**, Andronescu Ecaterina.



- Cobalt Aluminate Nanoparticles Obtained Through a Soft Chemistry Route Using Mentha Leaves Extract.
 Dana Gingaşu, Adelina-Carmen Ianculescu, Ovidiu Oprea, Simona Somacescu, Daniela C. Culita, Gabriela Marinescu, Jose Maria Calderon Moreno, Bogdan Stefan Vasile, Silviu Preda, Adrian-Vasile Surdu
- A bioactive tetraaza macrocyclic complex of Co(III) targets the M2 parallel G-quadruplex DNA structure: CD spectroscopic studies. Elena Gorincioi, Vasile Lozovan, Alic Barba, Alexandru Rotaru, Natalia Chiselita, Oleg Chiselita, Elena Tofan, Ion Bulhac
- Sodium lignosulfonate-derived porous carbons for application in energy storage and accumulation devices.
 Elizaveta V. Sivenkova, Serguei V. Savilov, Stepan Yu Kupreenko
- Characterization of Rare Earth-Doped Hydroxyapatite: Structural and Morphological Analysis Using SEM, TEM, and XRD Techniques; Diana G. Paduraru (Filip), Andrei V. Paduraru, Ecaterina Andronescu, Bogdan S. Vasile, Roxana D. Trusca
- 12. Fight Cavities: Nano Natural Agents. Taha Kaan Alkaya, Zeynep Imge Okuyan, Ozge Karaer

Thursday, 28 November 2024

09:30 - 12:00 – SESSION III. Food and Natural Compounds for Health - LINK Chairs: Anca MAZARE; Ioana DEMETRESCU

- 09:30-09:45 Production and Characterization of Apitherapy-Based Wound Dress. **Cihan Atmaca**, Cem Bülent Ustundag, Azime Erarslan
- 09:45-10:00 Production and Characterization of Calendula officinalis Extract Loaded Nanofibers. **Ebrar Ece Donmez**, Betul Kafiye Koc, Sumeyye Cesur, Oguzhan Gunduz
- 10:00-10:15 Nanocomposite Films Incorporating Amla Extract, AgNP, Cu-MOF for quality enhancement of Indian Cheese. **Pir Mohammad Junaid**, Mohammad Zia-ul-haq, Sadaf Zaidi
- 10:15-10:30 Human Food Chain Routed Micro /Nano Plastic Particles and their Jeopardies Assessment. **Thamizharasan S,** Hemalatha M.S, Priya G
- 10:30-10:45 Advancements in Biodegradable Packaging with Natural Extracts: Emerging Perspectives on Food Safety Applications. **Madalina-Casandra Covoran**, Adina Magdalena Musuc
- 10:45-11:00 Circular economy principles applied in the hospitality industry to reduce food waste.
 Raluca-Maria Ţâbuleac, Elena Diana Ungureanu Comăniță, Ersilia Lazăr Cosbuc, Isabela-Maria Simion, Maria Gavrilescu



11:00-11:15	Nutritional Profile, Fatty Acid Composition, Mineral Constituents, and Acute Toxicological
	Assessment of the flesh of H. aspersa Müller. Marouane Aouji, Malak Zirari, Amine Rkhaila,
	Bouchra Bouhaddioui, Rachid Bengueddour

- 11:15-11:30 Moringa Tree: A Natural Treasure for Nutritional and Industrial Applications. **Sunita Singh**, Avanish Chandra Sharma
- 11:30-11:45 Impact of Gallic Acid in Wastewater on Water Quality and Human Health: Chemical Mechanisms and Health Risks. Larisa Mocanu, Maria Gonta, Elizaveta Leontev
- 11:45-12:05 Synthetic and bionanocomposite coating for fruits and vegetables. **Rupak Kumar**

09:30 - 12:00 - SESSION IV. Materials for Anticorrosive and Environmental - LINK

Chairs: Gianluca VISCUSI; Roxana PITICESCU

- 09:30-09:45 Remediation of Zinc-polluted sites using mustard crops. **Mirela Cismasu (Enache)**, Ioana-Alexandra Ciocodei, Andrada-Cristina Ciucu
- 09:45-10:00 Exploring the Adsorption Properties of Modified Abies marocana Trab. needles for Methylene Blue Dye Removal. **Malak Zirari**, Marouane Aouji, Driss Hmouni, Nouredine El Mejdoub
- 10:00-10:15 Hybrid hydrogels based on PVA matrix for water remediation. **Ioana Ion**, Ciprian Mihai Mitu, Emanuel Virgil Marinescu, Cristina Antoanela Banciu, Alina Rucsandra Caramitu, Nicoleta Oana Nicula
- 10:15-10:30 Substituent Effect on Pyran-Pyrazole as Organic Inhibitors in Aggressive Medium: Experimental and Theoretical Studies. **Fatine El Farhani**, Ouakki Moussa, Benzekri Zakaria, Boukhris Said, Zouhair Elfakir, Said Bouzakraoui, Mohamed Ebn Touhami
- 10:30-10:45 Assessment of Copper Corrosion Resistance in 0.5M H₂SO₄: A Comparative Investigation
 Using Extracts from Two Moroccan Plants. Mzioud Khaoula, Habsaoui Amar, Rached Sara,
 Kharbouch Otmane, Ouakki Moussa, Ebn Touhami Mohamed
- 10:45-11:00 Sustainable Corrosion Inhibition of Carbon Steel in NaCl Solution Using Calcium-Cobalt Phosphate. **Nouhaila Ferraa**, Moussa Ouakki, Mohammed Cherkaoui, Mounia Bennani Ziatni



- 11:00-11:15 The anticorrosive capacity of Mentha pulegium L., against mild steel in sulfuric environment. **Sarah Rached**, Khaoula Mzioud, Otmane Kharbouch, Amar Habsaoui, Mohamed Ebn Touhami
- 11:15-11:30 Adsorption of Organic Contaminants on Sorbents Derived from Rice Husk Ash. Sergei S.Reshetko, Roman Yu. Novotortsev, Serguei V. Savilov
- 11:30-11:50 The Myth of Carbon Uptake from Environment on Ti and Anodic TiO₂ Surfaces. Anca Mazăre
- 11:50-12:10 Design of electrospun N-doped carbon dots/cellulose acetate system as efficient adsorbent of toxic dyes from contaminated waters. **Gianluca Viscusi**, Ștefania Mottola, Hebat-Allah S. Tohamy, Mohamed El-Sakhawy, Giuliana Gorrasi, Iolanda De Marco

12:00 - 13:00 - Plenary SESSION II. NanoBioMaterials for Health- LINK

Chairs: Jorg OPITZ; Liliana VERESTIUC

- 12:00-12:30 Nanomaterials for the Regulation of Inflammation. Sergej TOMIC
- 12:30-13:00 Intrinsically disordered peptides enhance regenerative capacities of bone composite xenografts. Havard J. HAUGEN

13:00-14:00 - LUNCH BREAK

14:00 - 17:00 – SESSION V. Materials with antioxidant, antimicrobial, and anticancer properties -

Chairs: Oguzhan GUNDUZ; Ovidiu OPREA

14:00-14:15 Dual-Layer Tissue Scaffold with Antibacterial Properties: Mechanical Support and Enhanced Tissue Regeneration for Advanced Wound Dressings. Irem Aydos, Sena Su Torun, Sevval Gunes, Sibel Daglılar, Eray Altan, Oguzhan Gunduz



- 14:15-14:30 A Tissue Scaffold Enriched with Cisplatin and Cranberry Plant in GelMA/Hap for Bone Cancer.
 Aysegul Tiryaki, Musa Ayran, Yeliz Göyük, Elif Kaya, Tubanur Avcı, Gulgun Tınaz, Oguzhan Gunduz, Ayse Ceren Calikoglu Koyuncu
- 14:30-14:45 Synthesis and Characterization of Graphene Oxide-Based Anticancer Drug Combination
 Functionalized with Folic Acid as a NanoCarrier for Methotrexate Targeted Delivery. Reyhan
 Yanıkoğlu, Canan Yağmur Karakaş, Mert Akın İnsel, Fatih Çiftçi, Cem Bülent Ustündağ
- 14:45-15:00 Treating Vaginal Yeast Infections with 3D Printing-Based Agents. **Fatih Mehmet Yıldız**, Melek Beyza Reyhanoğlu, Aysu Sarıkaya Yaşar
- 15:00-15:15 The Use of Bacterial Cellulose Coated with Salvia officinalis (Sage) Essential Oil in Wound Dressing Applications. **Hatice Simge Ozturk**, Azime Erarslan, Ahmet Kati
- 15:15-15:30 Nanoparticle-Based Drug Delivery Systems for Targeted Cancer Therapy. Rajesh Kumar Sharma, Jyoti Pandey, Deep Narayan Maurya, **Neelam Pawar**, Niranjan Babu Mudduluru, Revan Karodi, Arun Sharma, Archana Shaha
- 15:30-15:45 Synthesis, Antibacterial, Antiviral Study of Novel Schiff bases and their Vanadium complexes. **Khadija Khaldoune**, Ali Hasnaoui, Meriem Rafia, Naima Fdil, Mustapha Ait Ali
- 15:45-16:00 Evaluation of Antimicrobial and Antitumor Activities of Functionalized Nanostructures. **Stefan-Alexandru Gaftonianu**, Carmen Chifiriuc, Ecaterina Andronescu
- 16:00-16:15Fe-Cr-Nb-B Magnetic Nanoparticles: A Promising Tool for Targeted Cancer Cell Destruction.Anca Emanuela Minuti, Cristina Stavila, Horia Chiriac, Nicoleta Lupu
- 16:15-16:30 Design and Fabrication of a 3D-Printed Microneedle Bilayer Patch for the Treatment of Non-Melanoma Cancer. Louna Karzoun, Hilal Yilmaz, Yagmur Kazancıoglu, Esra Yuca Yilmaz, Cem Bulent Ustundag, Oguzhan Gunduz
- 16:30-16:45 Synthesis, spectral analysis and molecular docking of N-(prop-2-en-1-yl)-2-[4-(2,6,6trimethylcyclohex-1-en-1-yl)but-3-en-2-ylidene]hydrazine-1-carbothioamide with anticancer potential. **Iana Stoica**, Andrei Ciursin, Roman Rusnac
- 16:45-17:00 Optimization of Magnesium Phosphate Cements for Medical Applications: Influence of Mg/P and P/L Ratios. Anna Melnyk, Magdalena Górecka, Aleksandra Mielewczyk-Gryń, Anna Ronowska, Marcin Wekwejt



14:00 - 17:00 – SESSION VI. ADVANCED MATERIAL FOR SPECIFIC APPLICATIONS - LINK Chairs: Shanyu ZHAO; Victor FRUTH

- 14:00-14:15 Comparative Study on the Synthesis of Yttrium Aluminum Granate for Composite Scintillators. Adrian Moraru, Vladimir Lucian Ene, Cristina Constanța Gheorgiu, Adrian Ionuț Nicoară
- 14:15-14:30 Enhanced Photocatalytic Degradation of Azo Dye with ZnO Nanoparticles under Visible
 Light. Phytotoxicity Evaluation on a Common Plant Species. Maria Paiu, Lidia Favier, Doina
 Lutic, Raluca-Maria Hlihor, Véronique Alonzo, Maria Gavrilescu
- 14:30-14:45 New Insights into the Cytotoxicity and Biocompatibility of Three Types of Endodontic Materials – A Comparative Pilot Study. **Alexandra Popa**, Ecaterina Andronescu, Alexandra Ripszky, Bianca Voicu-Balasea, Florentina Duica, Mirela Sirbu, Marina Melescanu Imre, Silviu Mirel Pituru
- 14:45-15:00 Transport properties of ferrocene-based ionic liquid solution in acetonitrile. **Ivan Kozhatkin,** Ekaterina Arkhipova, Mikhail Levin, Anton Ivanov
- 15:00-15:15 Gold and zinc oxide nanocomposites for enhanced detection by Raman spectroscopy.
 Andrei Matei, Andrei Giuleșteanu, Sorin Ciucă, Iryna Makarchuk, Céline Keifer, Gregory Barbillon, Anne Carton, Benoit Pichon
- 15:15-15:30 Next-Generation Intumescent Coatings: Enhancing Fire Resistance in Steel Structures. Paul
 Valentin Lovin, Ana-Maria Albu, Iulia Neblea
- 15:30-15:45 Production and Characterization of Wound Dressings for Burn Treatment. Haya Akkad, Azime Erarslan, Esma Özerol
- 15:45-16:00 Functionalization of olefinic himachalene derivatives: Synthesis of novel functionalized sesquiterpenes. Issam Louchachha, Abdelmajid Faris, Youssef Edder, Brahim Boualy, Abdallah Karim, Mustapha Ait Ali
- 16:00-16:15 Covalently cross-linked carbon nanostructures: nanotubes/few-layer graphene nanoflakes hybrids. **Sergey Yakovlev**, DmitryStolbov, Eugenia Suslova, Serguei Savilov
- 16:15-16:30 The potential of nanotechnology and biomaterial in Alzheimer disease. **Reem Mohamednur**, Sevim Işık



- 16:30-16:45 Co-encapsulation of lipophilic APIs into niosomal carriers for antidiabetic therapy using thin film hydration method. **Andra Ababei-Bobu**, Florentina Geanina Lupașcu, Alexandru Sava, Ioana-Andreea Turin-Movilean, Oana Maria Ionescu, Mariana Pinteala, Lenuța Profire
- 16:45-17:00 Synthesis and analysis of 3-amino-5-(2-methylpropyl)-2-sulfanylideneimidazolidin-4-one based on the heterocyclization reaction. **Aliona Pîntea**, Roman Rusnac, Aurelian Gulea

17:00 - 18:00 – Poster Session III - LINK

Chairs: Cem Bulent Ustundag; Irina FIERASCU

- Sustainable Fabrication of Zinc Oxide Nanoparticles Incorporated into Sodium Alginate beads for Controlled-Release Biofertilizers. Yasmina Khane, Zoulikha Hafsi, Djaber Aouf, Fares Fenniche, Sofiane Khane, Abdelhalim Zoukel
- Exploring the Antibacterial Activity of Mixed-ligand Copper(II) Coordination Compounds with N-(4methoxyphenyl)-2-oxopropanamide 4-allylthiosemicarbazone. Ianina Graur, Vasilii Graur, Irina Usataia, Victor Tsapkov, Carolina Lozan-Tirsu, Greta Balan, Aurelian Gulea
- Eco-Friendly Silver-Modified Clay: Combating ISO SS Bacteria and Enhancing Malachite Green Dye Oxidation. Mirila Diana-Carmen, Rosu Ana-Maria, Georgescu Ana-Maria, Nedeff Florin-Marian, Jinescu Cosmin, Nistor Ileana-Denisa
- An investigative study of chemistry and Antimicrobial activity of Moringa oleifera seeds ethanol extract.
 Avanish Chandra Sharma, Sunita Singh
- Construction of a 3D Brain Model. Ekin Erdogan, Damla Arslantunali Sahin, Sreeparna Banerjee, Vasif Hasirci
- Evaluation of Haloxylon scoparium extract as a green antioxidant and corrosion inhibitor for ordinary steel in 1M HCl medium. Sara Haida, Moussa Ouakki, Mouhsine Galai, Mohamed Allaoui, Khaoula Mzioud, Hayat Elwardani, Sara Rached, Abdelaziz Ramadane KRIBII, and Abderahim KRIBII
- Study of Anticorrosive Properties of Thin Films in Acid Media. Oana Cătălina Mocioiu, Irina Atkinson, Raul Augustin Mitran, Cosmin Iulian Codrea, Veronica Bratan, Ludmilla Aricov, Nicoleta Vitan, Ana-Maria Mocioiu
- TiO₂-Supported Pd, Ag and Pd-Ag Nanoparticles: Preparation, Characterization and Photocatalytic H2 Evolution from Water Splitting. Anca Vasile, Florica Papa, Gianina Dobrescu, Veronica Bratan, Monica Pavel, Razvan-Nicolae State, Ioan Balint



- Synthesis and in vitro evaluation of bioactive composites for bone tissue engineering. Andrei-Alexandru
 Ivu, Claudia-Narcisa Stefanoaia, Liliana Verestiuc, Florina Daniela Cojocaru
- 10. Decorative Tiles. Symbolism, technical and chromatic problems. Mădălina-Oana Mihăilă, Ecaterina Andronescu
- 11. Innovative Liquid Crystalline Nanocoatings for Combating Implant Related Infections. **Seref Akay**, Oana Ciofu, Anan Yaghmur
- 12. A binary dumbbell visible-light-driven photocatalyst for simultaneous hydrogen production with the selective oxidation of benzyl alcohol to benzaldehyde. **Muhammad Tayyab**, Seemal Mansoor, Zeeshan Akmal, Mazhar Khan, Liang Zhou, Juying Lei, Jinlong Zhang.

17:00 - 18:00 - Poster Session IV - LINK

Chairs: Serguei SAVILOV, Sergiu COSERI

- Magnetic bioactive glass: synthesis, characterization and in-vitro bioactivity evaluation. Marian Raşcov, Anton Ficai, Ovidiu-Cristian Oprea, Otilia-Ruxandra Vasile, Ecaterina Andronescu
- Evaluation of Hyper-crosslinked Polystyrene Macroporous Resin on azo dye removal studies. Nicoleta Mirela Marin, Luoana Florentina Pascu, Gheorghe Cristian Serbanescu
- 3. A new application of polydivinylbenzene macroporous resin for Acid Orange 10 removal from aqueous solutions. **Nicoleta Mirela Marin**, Luoana Florentina Pascu, Gheorghe Cristian Serbanescu
- 4. Novel synthetic approach for 4-carboxyphenoxy and 4-fluorophenoxy tetrasubstituted palladium (II) phthalocyanines. Valeria A. Kirillova, Yana B. Platonova
- Dendritic Mesoporous Silica Magnetic Core-Shell Nanoparticles used as a drug delivery system. D. A.
 Vasile, L. Motelica, O. Oprea, D. Ficai, A. Ficai
- Biomaterials for Bone substitutes synthesized from organic waste. Geanina Buşcă, Adrian Surdu, Roxana Truşcă, Ludmila Motelica, Anton Ficai
- Materials with applications in dye degradation. Ana-Maria Fulgheci, Roxana Truşcă, Ludmila Motelica, Adrian Surdu, Anton Ficai
- 8. Copper recovery from mine water through adsorption using clinoptilolite. **Ana-Maria Turculeţ**, Anton Ficai
- Fabrication of Electrospun Polylactic acid/Polyhydroxybutyrate/Silk Fibroin Nanofibers to Obtain Retinal Nerve Fiber Layer and Its Application for Retinal Diseases. Sureyya Elif Çelik, Ayse Ceren Calıkoglu Koyuncu-Songul Ulag-Oguzhan Gündüz



- 10. Combining Spectral Methods, Acid-Base Titrations and Computational Methods for Elucidation of Metal Binding Mechanisms on Activated Carbons. **Irina Ceban**, Amelia Bocirnea, Iolanta Balan, Raisa Nastas
- 11. Dielectric Spectroscopy of Melt-Mixed Epoxy resin and Pyrolytically Stripped Carbon Nanofiber Composites. **R. Belhimria**, N. Aribou, A. J. Paleo, M.E. Achour
- Improving the optical properties of MoO₃ for Electrochromic application. Sagir Ziya'ulhaq, T.H. Darma, Abdu Y., M.D. Nurhafizah

Friday, 29 November 2024

09:30 - 13:00 – SESSION VII. SIMULATIONS, OPTIMIZATIONS AND USE OF ARTIFICIAL INTELLIGENCE IN MATERIALS PROCESSING AND DESIGN - <u>LINK</u> Chairs: Klaas-Jan TIELROOIJ; Graziella-Liana TURDEAN

- 09:30-09:45 The effect of cellulose nanofibers concentration on the behaviour of nanoemulsions. **Gabriela – Mădălina Oprică**, Cătălina – Diana Uşurelu, Adriana Nicoleta Frone, Cristina Firincă, Cristian – Andi Nicolae, Radu Claudiu Fierăscu, Denis Mihaela Panaitescu
- 09:45-10:00 Design of a PVA-Based Nanofiber Wound Dressing Containing Silver Nanoparticles Reduced by Aloe Vera to Accelerate Healing in Diabetic Foot Ulcers. **Dilek Aygun**, Cem Bulent Ustundag, Azime Eraslan, Ayşe Betul Bingol, Cihan Atmaca, Alpay Kose
- 10:00-10:15 The capabilities of cerium oxide in general and dental treatment. **Cirică Eric-Cristian**, Ecaterina Andronescu, Anton Ficai, Ovidiu Oprea, Lucian-Toma Ciocan
- 10:15-10:30 Design and Production of 3D Printed Tissue Scaffold for Use in Skin Tissue Engineering Applications. **Miray iş**, Azime Erarslan, Cem Bülent Üstündağ
- 10:30-10:45 Optimization studies of rGO-FeO-MnO₂-ppy as electrode materials for asymmetric supercapacitors. **Balarabe El-yaqub**, Mohd Haniff Wahid, Zulkarnain Zainal, Abdul Halim Abdullah, Wan Azlina Wan Ab Karim Ghani
- 10:45-11:00Valuable and Versatile Polymeric Building Blocks: Foundations for Innovative Materials.Alecu Alin Ionuţ, Albu Ana Maria
- 11:00-11:15 The Perspectives on the Use of Augmented Reality in Oncology Through the 3D-Printing Technologies. **Valic Eugeniu**, Valic Vladimir, Ciobanu Daniela, Șchiopu Victor
- 11:15-11:30 Data Analysis for Nanoscience Research. Sabirin iman Omar



- 11:30-11:45 Interwoven Architectural Complexity in Ni(II) Ion-Based 3D MOF Using Bipyridine and Tetrabenzenecarboxylic Acid: Adsorption Insights in Highly Efficient Iodine and Cationic Dye Capture. **Shaikh Arfa Akmal**, Mohd Khalid.
- 11:45-12:05 Possibilities for Al. Grigore Psenovschi
- 12:05-12:25 Transparent Coatings with Anticorrosive and Hydrophobic Properties Used for Self-Cleaning of Photovoltaic Solar Panels. **Oana Cătălina Mocioiu**
- 12:25-12:45 ClO₂ as a Versatile Preservative: Mechanisms, Generation Methods, and Potential Applications for Fruit and Vegetable Preservation. **Siddharth Thakur**
- 12:45-13:00 General Discussions

09:30 - 13:00 – SESSION VIII. NATURAL, GREEN AND BIOMIMETIC MATERIALS - LINK Chairs: Charles Oluwaseun ADETUNJI; Mihaela DONI

- 09:30-09:45 The Effect of Infill Percentage on 3D Printed PVA Substrates: Controlled Gallic Acid Release Study. Sevil Cikrikci Erunsal, Erinc Bahcegul, Gokce Bahcegul
- 09:45-10:00 Production and Characterization of Valproic Acid Loaded GelMA/Sodium Alginate 3D Scaffolds for Epilepsy Research. **Zeynep Sünbül**, Canan Bozyokuş, Dilruba Baykara, Cem Bülent Üstündağ, Oğuzhan Gündüz
- 10:00-10:15 Collagen-based composite biomaterial for medical application. Jian Mariana, Mostovei Andrei, Motelica Ludmila, Nacu Ana Maria, Oprea Cristian Ovidiu, Solomon Oleg, Cobzac Vitalie, Ficai Anton, Nacu Viorel
- 10:15-11:00 Silver Nanoparticles mediated by Daucus carota L. Extract via Facile Green Synthesis against Brain cell lines. **Ikechukwu P. Ejidike**
- 11:00-11:15 Production and Characterization of Caffeic Acid-Loaded Wound Dressings Using 3D Printing Technique. **Kevser Duman**, Sena Celik, Zekiye Akdag, Muhammad Khaqan Zia, Asima Asghar, Tayyaba Bari, Songul Ulag, Canan Dogan, Fakhera Ikram, Oguzhan Gunduz
- 11:15-11:30 Gold Nanoparticles Synthesized using Plant Extracts for the Specific Detection of Various Analytes. **Melinda David**, Teodor A. Enache, Monica Florescu, Camelia Bala



- 11:30-11:45 Nanostructured Multicomponent Bioinks with Synergistic Nanodiamond and Magnesium-Doped Hydroxyapatite for Enhanced Bone Tissue Engineering. **Carmen-Valentina Nicolae**, Masoumeh Jahani Kadousaraei, Mehmet Serhat Aydin, Shuntaro Yamada, Niyaz Al-Sharabi, Ahmad Rashad, Elisabetta Campodoni, Monica Sandri, Doris Steinmüller-Nethl, Kristin Syverud, Kamal Mustafa, Izabela-Cristina Stancu
- 11:45-12:00 Production of Smart Wound Dressings Containing Gelma, Propolis and Green Tea Using 3D Printing to Support Diabetic Wound Healing. **Onur Ezgi Gezen**, Kübra Arancı Ciftci, Özgür Yılmaz, Azime Eraslan
- 12:00-12:15 Production of conductive scaffolds for tissue engineering applications; **Burcu Ozge Ozevin**, Büşra Oktay, Esma Ahlatcıoğlu Özerol
- 12:15-12:35 Nanoscale Cellulose Derivatives. Serguei V. Savilov
- 12:35-13:00 General Discussions

13:00 - 14:00 – Plenary SESSION III. MATERIALS FOR QUANTUM AND ENVIRONMENTAL APPLICATIONS - LINK

Chairs: Heiko FRANZ; Radu Claudiu FIERASCU

- 13:00-13:30Integrating environmental phyto-remediation with biomass valorization for the recovery of
some critical metals and energy by phytomining. Maria GAVRILESCU
- 13:30-14:00 Hot Quantum Materials. Klaas-Jan TIELROOIJ

14:00-14:30 - CLOSING CEREMONY - LINK

Chair: Ecaterina ANDRONESCU



HARNESSING BIOGENIC NANOMATERIALS FOR SUSTAINABLE SOLUTIONS: INNOVATIONS IN ENVIRONMENTAL MANAGEMENT, HEALTHCARE, INDUSTRY, AND AGRICULTURE

Charles Oluwaseun ADETUNJI

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ABSTRACT

The global population has been forecasted to increase drastically to 9 billion in the year 2050, therefore, there is a clarion call to all scientists and relevant stakeholders to come up with innovative solutions that could help in meeting the unlimited need of the ever increasing population as well as help in achieving sustainable goals. Interestingly, the rapid advancement of nanotechnology has introduced a transformative paradigm in sustainable development, with biogenic nanomaterials at the forefront of this evolution. Majority of these are derived from natural sources such as plants, fungi, and microorganisms while these materials offer a myriad of applications that could address critical challenges in environmental management, healthcare, industry, and agriculture. Therefore, this invited talk intends to provide recent development from the application of biogenic nanomaterial in resolving different challenges from Environment, Agriculture, Health sector and in the Industry. Biogenic nanomaterials play pivotal role in restoration of heavily polluted environmental through their exceptional capabilities in air and soil bioremediation. Their inherent high surface area and reactivity enable efficient degradation of pollutants, including toxic heavy metals and organic contaminants. This innovative approach not only facilitates the cleanup of polluted environments but also aligns with the principles of the circular economy by promoting sustainable waste management and resource recovery. The application of biogenic nanomaterials in environmental remediation underscores their role in advancing ecological sustainability. In healthcare, biogenic nanomaterials are revolutionizing therapeutic interventions with their applications in controlled drug delivery and regenerative medicine. The ability of these nanomaterials to be engineered for precise targeting enhances the efficacy of treatments while minimizing adverse effects. Their use in developing biocompatible scaffolds and implants for bone and tissue regeneration represents a significant advancement in regenerative medicine. The industrial sector benefits from the incorporation of biogenic nanomaterials in the development of novel materials and advanced processing techniques. Moreover, emphasis on sustainable industrial practices highlights the potential of biogenic nanomaterials to produce eco-friendly and high-quality products. In agriculture, biogenic nanomaterials offer innovative solutions for enhancing soil health, precision agriculture, and the controlled release of agrochemicals. Their application improves



soil nutrient availability, supports targeted delivery of fertilizers and pesticides, and contributes to increased crop yields with reduced environmental impact. Therefore, the sector advances towards achieving food security and promoting sustainable farming practices by integrating biogenic nanomaterials into agricultural practices. On the whole, this scientific talk will elaborate more on next generation nanomaterials that are biogenic in nature and the prominent role they play in diverse sectors which represents a pivotal advancement in sustainable solutions. This might be linked to their unique properties which enable them to perform numerous significant innovations that could address environmental, medical, industrial, and agricultural challenges, thereby, paving the way for a more sustainable and resilient future. This scientific talk will provide more information on translation research aspects of these biogenic materials and diverse transformative potential of these biogenic nanomaterials and the role they play in contributing to the advancement of sustainable development across multiple domains.

KEYWORDS:

Biogenic Nanomaterials, Environmental Management, Healthcare, Industry, and Agriculture



PROCESSING AND DESIGN OF MATERIALS FOR BONE TISSUE ENGINEERING

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Academy of Romanian Scientists, Ilfov Street 3, 050044 Bucharest, Romania.

ABSTRACT

Considering the very high need of bone grafts, about 49% of the total market share of the grafting materials, many researchers focused their efforts in developing new and improved grafting materials: metals and alloys (firsts generation of biomaterials), ceramics and polymers (second generation of biomaterials), composites and nanocomposites (third generation of biomaterials) but also tissue engineered grafts (fourth generation of biomaterials). In the development of all these materials, researchers tried to design materials with improved or even new properties by compositional and morpho-structural design having in mind pure regenerative purposes or even the treatment of bone-specific diseases including infections, cancer, osteoporosis, etc. Since the very beginning, porous or dense materials were developed, in many cases biomimetic approaches were considered but also, starting from the second generation of biomaterials the circularity and green synthesis were more and more used in developing grafting materials. Currently, many researchers are trying to develop materials by exploiting the benefits of the additive manufacturing methods.

Acknowledgements:

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INTEGRATING ENVIRONMENTAL PHYTO-REMEDIATION WITH BIOMASS VALORIZATION FOR THE RECOVERY OF SOME CRITICAL METALS AND ENERGY BY PHYTOMINING

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ABSTRACT

The study addresses the global shortage of raw materials and energy, driven by supply limitations, commodity scarcity, rising demand, and geopolitical and environmental instability. These issues have heightened the demand for critical raw materials (CRMs), particularly in the European Union, where reliance on external suppliers threatens economic and technological stability. The European Commission's initiatives, including the Raw Materials Initiative and the Strategic Implementation Plan (SIP), underscore the importance of securing CRM supplies to support green technologies and a circular economy. The 2023 EU criticality assessment highlights metals essential for industries like electronics, renewable energy, and transportation, and stresses the supply risks due to their concentration in a few countries.

The rapid depletion of CRMs essential for modern technology and sustainable energy systems has underscored the urgent need for alternative recovery methods that are both economically viable and environmentally sustainable. This research investigates phytomining, an innovative process combining phytoremediation and biomass valorization to extract valuable metals from low-grade ores or contaminated soils. Unlike traditional mining, which often requires extensive infrastructure and has significant environmental impacts, phytomining offers a low-impact, plant-based alternative that harnesses the natural metal-accumulating abilities of specific plants, known as hyperaccumulators, to absorb and concentrate metals in their tissues.

Phytoremediation is the initial stage in the phytomining process, where hyperaccumulating plants are cultivated on contaminated or metal-rich soils. These plants, capable of absorbing and storing high concentrations of metals like nickel, cobalt, copper, and zinc, offer a dual benefit: they extract valuable metals while remediating polluted soils. By mitigating heavy metal pollution, phytoremediation addresses the persistent threat posed by non-degradable contaminants in soils, which, if left unmanaged, can lead to



long-term ecological and health risks. The use of hyperaccumulators is particularly advantageous in regions where soil contamination has rendered land unusable for agriculture or conventional development.

In the second stage, biomass valorization, the harvested plant material undergoes processing to extract the accumulated metals. Methods such as ashing, smelting, and leaching are applied to convert the biomass into a form of "bio-ore" rich in target metals. This bio-ore can then be refined using hydrometallurgical and pyrometallurgical processes, including bioleaching and electrowinning, to recover purified metals suitable for industrial use. The PHYTOMIN project exemplifies this approach, with experiments focusing on the cultivation of plants such as alfalfa, rapeseed, white mustard, and pigweed on metal-contaminated soils. The study found that these plants effectively absorb and concentrate heavy metals, making them viable candidates for phytomining applications.

Experimental results from the PHYTOMIN project revealed the presence of metals accumulated in plant biomass, particularly in the roots. For example, pigweed demonstrated a strong ability to accumulate nickel and cobalt ions from moderately contaminated soils. Techniques such as chemical digestion and incineration were employed to maximize metal recovery, with incineration yielding higher metal extraction rates in certain cases. These findings underscore the potential of phytomining as a cost-effective and environmentally sustainable method for generating secondary raw materials, which could partially offset the demand for newly mined metals.

However, the large-scale implementation of phytomining faces several challenges. The success of phytomining depends on factors such as the bioavailability of metals in soil, climate and hydrological conditions, seasonal variability, and the physiological limitations of the selected plants. Additionally, phytomining may not be suitable for all metals, as its effectiveness varies based on the type and concentration of contaminants. Despite these challenges, phytomining potential for commercial application is promising, particularly as global demand for CRMs continues to rise. As technology advances, further research into plant biology, soil science, and extraction methods may help optimize phytomining processes, making it a more efficient and widely applicable solution.

In conclusion, phytomining represents a forward-looking approach that aligns with the principles of a circular economy, addressing both resource scarcity and environmental pollution. By converting contaminated land into a source of valuable metals, phytomining not only supports environmental cleanup but also contributes to resource security. This research advocates for the continued exploration and development of phytomining as a viable alternative for metal recovery, supporting the European Union goals for a resilient, sustainable, and resource-efficient economy.



2D TRANSITION METAL CARBIDES AND NITRIDES (MXenes) AND THEIR BIOMEDICAL APPLICATIONS

Yury GOGOTSI

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ABSTRACT

More than 40 stoichiometric MXene compositions and dozens of solid solutions and structures with various terminations have been reported since the first report on $Ti_3C_2T_x$ in 2011 [1]. The number of possible MXene compositions is infinite if one considers solid solutions (more than 50 have been made in our lab) and combinations of surface terminations. New subfamilies of in- and out-of-plane ordered MXenes, oxycarbides, 2D borides, and silicides further expand the family of non-oxide 2D materials based on transition metals. MXenes have also opened an era of computationally driven atomistic design of 2D materials. Many MXenes studied to date are biocompatible, particularly Ti, Nb, Ta carbides, etc. They possess electronic, optical, mechanical, and electrochemical properties that differentiate them from other materials. In particular, Ti_3C_2 has high metallic and ionic conductivity, and its conductivity greatly exceeds that of carbon nanomaterials. Moreover, MXene properties are tunable by design and can be modulated using light or applied potential.

This presentation will discuss the structure, synthesis methods, biocompatibility, and biomedical application of several MXene variants. I'll explain the synthesis effect on composition and properties and outline prospects for biomedical applications of MXenes ranging from photothermal therapy to tissue engineering, biosensing, and implantable and epidermal electrodes [2-4]. This analysis is expected to pave the way for more MXene compositions to be explored in the biomedical and healthcare fields.

References

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INTRINSICALLY DISORDERED PEPTIDES ENHANCE REGENERATIVE CAPACITIES OF BONE COMPOSITE XENOGRAFTS

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ABSTRACT

Biomaterial scientists design organic bone substitutes based on the biochemical properties of the mimicked tissue to achieve near-native functionality. Several non-collagenous proteins in bone are known as intrinsically disordered proteins (IDPs), as they lack detectible ordered domains and a fixed 3D structure under physiological conditions. Many IDPs perform regulatory roles in a range of cellular functions, which motivated us to design two proline-rich disordered peptides (P2 and P6) and augment them into the SmartBone® (SBN) biohybrid substitute. Recently we reported an improved proliferation and osteogenesis of human osteoblasts and mesenchymal stem cells in the composite groups containing peptides (named here as SBN+P2 and SBN+P6) in vitro. To address the effects of these composites on bone formation and biomineralization, this in vivo study investigated their functions in critical-size craniotomy defects in 16 domestic pigs after 8 and 16 weeks of healing. For this purpose, we used cone beam computed tomography (CBCT), microCT (µCT), histology, immunohistochemistry, fluorescent labelling of abundant reactive entities (FLARE), synchrotron SAXS/XRD, optical photothermal IR (O-PTIR) microscopy and nanoscale atomic force microscopy-infrared (AFM-IR) analyses. Our results represent new synthetic IDPs as potential candidates for directing bone formation and biomineralization. In addition, the SBN+P6 stimulated significantly higher bone formation and biomineralization after 8 weeks of healing than other groups indicating its potential to stimulate early biomineralization. Finally, after 16 weeks of healing, the SBN+P2 induced significantly higher bone formation and biomineralization compared to other groups indicating its effects on later bone formation and biomineralization processes. In addition, the strong stretching of amide primary and secondary IR absorbance peaks at 1660 and 1546 cm⁻¹ in the SBN+P2 group verified that this peptide experienced more conformational changes after 16 weeks of implantation with a higher phosphate intensity at 1037 cm⁻¹ compared to peptide 6. P2 and P6 are promising for bone augmentation strategies in critical clinical applications. Finally, we concluded that FLARE and O-PTIR are promising tools for evaluating and diagnosing bone tissue's biochemical structure and the bone-biomaterial interface.

KEYWORDS: Intrinsically Disordered Proteins, Proline-rich motifs, Bone regeneration, Bone graft substitute, Biomineralization



HOT QUANTUM MATERIALS

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ABSTRACT

Quantum materials exhibit several exciting ultrafast physical phenomena that are moreover potentially technologically useful. This is particularly true for quantum materials with massless Dirac electrons, such as graphene and topological insulators. When light is absorbed in these materials, electron heating occurs through electron-electron interactions on a 10-100 fs timescale, followed by electron cooling, typically involving the emission of phonons on a picosecond timescale. We have exploited these ultrafast thermodynamics to generate harmonics in the terahertz (THz) regime [1], which is particularly efficient in "quantum metamaterials" consisting of a quantum material and a metallic grating [2]. Thanks to an efficient "Coulomb cooling" mechanism between surface and bulk electronic states in topological insulators [3], we have recently demonstrated that the ultrafast thermodynamics can give rise to third-order terahertz harmonic generation approaching the milliwatt regime [4]. Furthermore, quantum metamaterials enable fast and gate-tunable conversion from THz light to visible light [5]. These results establish quantum materials as an excellent material platform for nonlinear terahertz photonics, with possible applications in next-generation wireless communication systems, among others.

Whereas these ultrafast thermodynamics in graphene and topological insulators are relatively well understood, this is not the case for twisted bilayer graphene near the magic angle. Using time-resolved photocurrent measurements, we have studied these dynamics, finding that the electron cooling dynamics in twisted bilayer graphene near the magic angle is very distinct from the dynamics in monolayer or non-twisted bilayer graphene. Specifically, the cooling time in near-magic twisted bilayer graphene is a few picoseconds all the way from room temperature down to 10 K. We ascribe these observations to Umklapp-assisted electron-phonon cooling, facilitated by the moiré pattern in twisted bilayer graphene [6]. These results establish twist angle as control knob for steering the cooling dynamics and flow of electronic heat, and have possible implications for the development of ultrafast detectors operating at cryogenic temperatures, among others.

Besides interesting phenomena related to the thermodynamics of electrons in quantum materials, there are also important questions that require answers related to the transport and dynamics of phonons in quantum materials and 2D layered materials. This is particularly true for transition metal dichalcogenides, such as MoSe₂, which are projected to be used in future transistor technologies. We studied how phonon



heat transport changes with thickness [7,8], and have recently observed interesting novel heat transport phenomena in these ultrathin semiconductors, by exploiting our novel experimental technique to study heat transport directly in space and time [9, 10].

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NANOMATERIALS FOR THE REGULATION OF INFLAMMATION

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ABSTRACT

Modulation of the innate and adaptive immune response is a key therapeutic approach for targeting most severe diseases, such as malignant diseases, autoimmune diseases, and infections. The existence of numerous mechanisms regulating the immune response often complicates the precise control of the host response, which may lead to developing side effects. Key immune cells at the crossroads of innate and adaptive immunity are dendritic cells (DCs), which tightly control inflammation and immune tolerance. The application of autologous immune cells educated in vitro, such as DCs, although promising, can be extremely expensive, and its effectiveness is often variable due to the complex protocols and variable conditions for cell therapy production. Nanomaterials could overcome numerous problems in immunotherapy. They possess a large surface area available for conjugation, allowing the binding and delivery of various combinations of biomolecules and antigens to the target tissues and cells. The production of nanomaterials is becoming increasingly cheaper, and the knowledge we gained is growing exponentially, both in terms of their physicochemical properties and their biocompatibility. Numerous studies, including our own on gold nanoparticles, carbon nanotubes, graphene quantum dots, cellulose nanofibers, nanocrystals, polymers, etc., have shown that nanomaterials can display intrinsic immunomodulatory properties, which depend on their source, shape, size, degradability, etc. Moreover, nanomaterials can trigger different signaling mechanisms, thus inducing different effects in DCs and the subsequent immune response. Combining the nanomaterials and their properties opens up numerous possibilities in immunotherapy, including the possibility for "precise education" of DCs in vivo, both in a temporally and spatially controlled manner. However, for the clinical application of nanomaterials, it is first necessary to resolve their safety and the mechanisms of interaction with the immune system. Here we argue that DCs present an excellent model for these kind of studies, enabling the rational designing of the nanomaterials suitable for novel immunotherapeutic approaches.

Keywords: Nanomaterials, Dendritic cells, Immune response, Immunotherapy, Biocompatibility



ENGINEERING VERSATILE METAL-BASED CO-CATALYSTS FOR SOLAR-TO-FUEL CONVERSION

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ABSTRACT

Abating the excessive utilization of fossil fuels is a major challenge in the development of a sustainable society. In this regard, it is urgent to explore clean and green energy resources, such as solar energy, to replace fossil fuels. Among the various options to utilize the abundant solar energy, semiconductor-based photocatalysis, which can directly harvest energy from sunlight and convert it into chemicals and fuels, attracted considerable attention since the pioneering work of Honda and Fujishima in 1972. Especially, photocatalytic fuel generation, such as water splitting, has been regarded as one of the most promising strategies for addressing the growing demand for renewable and clean energy resources to simultaneously alleviate energy and environmental issues.

To date, diverse semiconductor-based photocatalysts have been reported including TiO₂, C₃N₄, CdS, etc., for solar energy conversion. Unfortunately, single semiconductor photocatalysts generally suffer from unsatisfactory solar-to-fuel conversion efficiency due to the unwanted recombination of photogenerated electron-hole pairs and the lack of surface reaction sites. To address these issues, enormous efforts have been devoted to developing efficient photocatalysts by loading cocatalysts, constructing heterojunctions, and controlling morphology and crystallinity. Among these strategies, coupling semiconductors with noble metal cocatalysts has been claimed to have multiple benefits, including improving light absorption, reducing reaction barriers, increasing the number of reactive sites, inhibiting electron-hole pair recombination, and regulating product selectivity.

In this talk, I will discuss the engineering of metal-based composites for photocatalytic solar-to-fuel conversion, focusing on discussing the modification strategies of metal nanostructures (NSs) that are used to enhance the overall photocatalytic performance, including controlling the morphology, size, crystal phase, defect engineering, alloying with different metals, modulating interfacial interaction, and introducing an external field.



ADDITIVE MANUFACTURING OF BIO-AEROGELS WITH STRUCTURE-CORRELATED THERMAL, MECHANICAL, AND BIOLOGICAL PROPERTIES

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ABSTRACT

Biopolymer aerogels are lightweight, highly porous materials derived from natural polymers such as cellulose, chitosan, starch, and alginate, and are gaining increasing attention due to their sustainability and biodegradability, offering a more eco-friendly alternative to synthetic counterparts. These aerogels combine low density, large surface area, and tunable porosity, providing excellent mechanical strength, thermal insulation, and adsorption properties, making them suitable for diverse applications such as drug delivery, water purification, energy storage, and thermal insulation. Additive manufacturing (AM) has emerged as a versatile tool for creating complex geometries and customized functionalities in material design. However, the challenge with applying AM to biopolymer aerogels lies in selecting a method that preserves the desired microstructures while achieving intricate macroscopic designs in a single sample. The research team at Empa is working on a direct ink writing method for 3D printing intricate, high-fidelity biopolymer aerogel forms. These printed aerogels exhibit tunable anisotropic mechanical and thermal properties by incorporating fibers of different length scales into the hydrogel inks. The alignment of these structures significantly enhances mechanical strength and thermal resistance. Due to the special gel structures induced by the ink, the printed aerogels also demonstrate excellent rehydration properties for biomedical applications, retaining their high surface area ($\approx 300 \text{ m}^2/\text{g}$) while significantly improving mechanical properties. Preliminary studies show that these printed aerogels exhibit excellent cellular viability (>90% for NIH/3T3 fibroblasts) and significantly improved drug release profiles, such as for Ketoprofen.

KEYWORDS: Biopolymers, Aerogels, Additive manufacturing, structure-properties correlation

