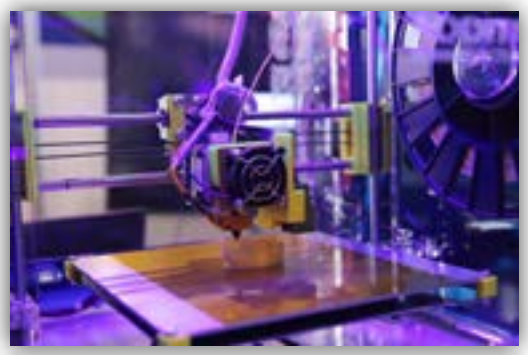
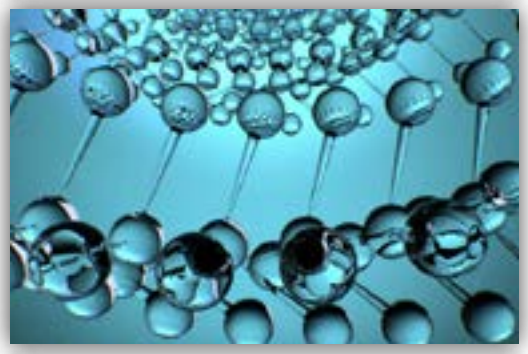
13th Annual Conference on

Materials Science, Metal and Manufacturing

November 16-17, 2017 Paris, France

Keynote Forum

Day 1



J Ruben Morones-Ramirez, Mater Sci Nanotechnol 2017, 1:2

J Ruben Morones-Ramirez

Universidad Autonoma de Nuevo Leon, Mexico

Nano-biotechnology strategies and engineering design approaches towards the development of smart therapeutics biomaterials against infectious diseases

There is a growing need to enhance our antibacterial arsenal given the rising incidence of antibiotic resistance, the emergence of novel virulent pathogens, and the almost 40-year innovation gap between introductions of new molecular classes of antibiotics. In the face of newly infectious organisms and the global crisis in antibiotic resistance, there is a need to invigorate the basic science and technology of antimicrobial development. This work, describes different engineering approaches to resolve some of the challenges in antibiotic development. The first approach involves exploring potentiation of current antibiotics using novel and naturally existing therapeutic adjuvants (such as silver and supplementary metallic micronutrients) based on a better understanding of the mechanisms of infectious disease, a comprehension of microbe-therapeutic biochemical interactions as well as the microbial genetic responses to therapeutics. The second approach includes some of the work in progress to develop novel drug delivery systems, using the interface of Nanotechnology and Synthetic Biology, to design intelligent and endogenous antimicrobial therapeutics. The final approach addresses the commitment to discover novel antimicrobial molecules and therapies. This work, in the third approach, describes an innovative mechanism to discover antimicrobial molecules through the identification of fruitful competitive biochemical interactions between a set of microorganisms in synthetic and natural ecologies.

Recent Publications

- JR Morones-Ramirez, JA Winkler, CS Spina, and JJ Collins (2013) Silver enhances the activity and broadens the spectrum of antibiotics against Gram-negative bacteria. Science Translational Medicine. 5: 190ra81. (2013)
- S Kalghatgi, CS Spina, JC Costello, M Liesa, JR Morones-Ramirez, S Slomovic, A Molina, OS Shirihai, and JJ Collins (2013) Clinically relevant doses of bactericidal antibiotics induce oxidative damage in mammalian cells via a common mechanism. Science Translational Medicine. 5: 192ra85.
- JR Morones-Ramirez (2014) Coupling metallic nanostructures to thermally responsive polymers allow the development of intelligent responsive membranes. International Journal of Polymer Science. 2014: 1-7.
- Garza Gonzalez MT, Barboza Perez D, Vazquez Rodriguez A, Garcia-Gutierrez DI, Zarate X, Cantú Cardenas ME, Urraca-Botello LI, Lopez-Chuken UJ, Trevino-Torres AL, Cerino-Córdoba FJ, Medina-Ruiz P, Villarreal-Chiu JF, JR Morones-Ramírez (2016) Metal-induced production of a novel bioadsorbent exopolysaccharide in a native Rhodotorula mucilaginosa from the Mexican Northeastern region. PLoS One. 11(2): e0148430.

- Garza-Cervantes J A, Chávez-Reyes A, Castillo E C, García-Rivas G, Ortega-Rivera O A, Salinas E, JR Morones-Ramirez (2017) Synergistic antimicrobial effects of silver/transition-metal combinatorial treatments. Scientific Reports. doi:10.1038/s41598-017-01017-7.

Biography

J Ruben Morones-Ramirez is a Full Time Professor in Chemical Engineering Department of the Universidad Autonoma de Nuevo Leon (UANL). He is the Principal Investigator of the NanoBiotechnology Research Group (www.rubenmorones.com) and is the Director of the Biotechnology and Nanotoxicology Research Center (www.cibyn.uanl.mx) of the UANL. His research focuses on projects at the intersection of the fields of Nanotechnology and Systems and Synthetic Biology to advance in the development and design of therapeutics, materials and alterative and clean energy. He has written more than 20 research articles, has more than 5,000 citations and his work has been highlighted in diverse prestigious press sources. He has won numerous awards, including the MIT Technology Review Innovator of the Year and the Innovator of the Year award by the Mexican Institute of Chemical Engineering.

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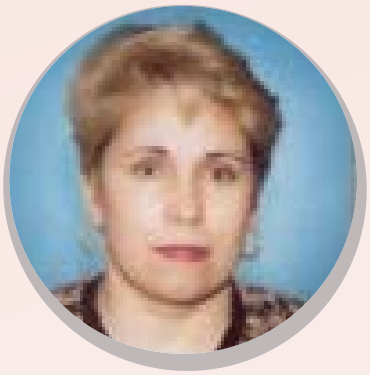
H Daniel Wagner, Mater Sci Nanotechnol 2017, 1:2



Benea Lidia

CC-Ites - Dunarea de Jos University of Galati, Romania

Electrochemical methods as promising routes for nanostructuration and functionalization of materials and biomaterials

Electrochemical methods for the preparation of high-quality nanostructured surfaces and functionalization through active biomolecules electrodepositions are highlighted in this work. There are two applied electrochemical methods in our laboratories to obtain hybrid and nanocomposite structured layers or advanced functionalization of material surfaces: (i) direct electrochemical synthesis by electro co-deposition process and (ii) anodization of materials to controlled growth of nanoporous oxide films followed by the electrodeposition of hydroxyapatite or organic compounds into porous films. The main goal of the present paper is to make a summary on results obtained from applying electrochemical surface modification techniques in obtaining advanced functional surfaces and their properties characterization in terms of surface morphology and structure (SEM-EDX, XRD), the roughness and thickness, corrosion, tribocorrosion as well as the mechanical properties as nanohardness or wear resistance. Electrodeposition and the combination of electrodeposition with other electrochemical processes as controlled oxide growth by anodization can lead to a large class of hybrid layers and composite coatings or nanostructured layers (films) on different support materials and structures necessary for a future based on nanotechnology and nanomaterials to improve the surface functionalization of materials face of aggressive environments and degradation processes. Improving surface properties for corrosion and tribocorrosion of materials in specific environments give more valuable industrial and biomedical applications by increasing their life cycle.

Biography

Benea Lidia completed her PhD thesis in 1996 from Dunarea de Jos University of Galati, Romania in Materials Engineering Domain. She is the Director of research center Competences Centre Interfaces - Tribocorrosion and Electrochemical Systems (CC-Ites) and Professor of Dunarea de Jos University of Galati, Romania. She has over 250 publications that have been cited over 1400 times, and her publication H-index is 19. She has been serving as an editorial board member of reputed Journals. She was credited by Thomson Reuters as a 2016 Highly Cited Researcher because her work has been identified as being among the most valuable and significant in the field. Very few researchers earn this distinction – writing the greatest number of reports, officially designated by Essential Science Indicators as Highly Cited Papers. In addition, these reports rank among the top 1% most cited works for their subject field and year of publication, earning them the mark of exceptional impact.

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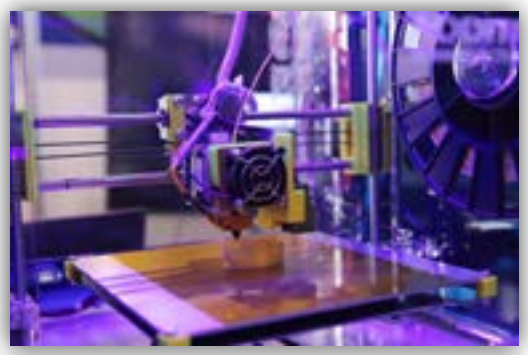
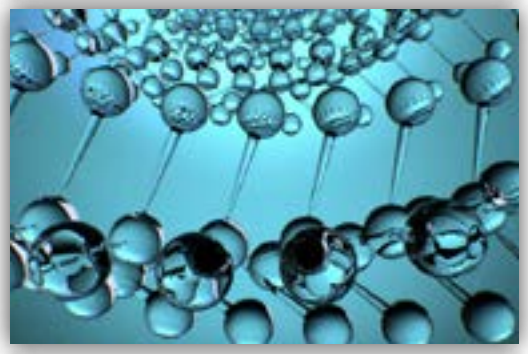
Day 2



Xavier Obradors, Mater Sci Nanotechnol 2017, 1:2

Xavier Obradors
ICMAB-CSIC, Spain

Nanostructured high critical current superconducting wire research and development

There is a worldwide huge effort in the R&D of high current superconducting wires for large scale power applications and magnets which encompasses many materials science and engineering challenges. Coated conductors based on epitaxial $YBa_2Cu_3O_7$ (YBCO) films are one of the most promising alternatives to reach the required performance goals, as well as to reduce the cost down to the levels required to make a reality these technological expectances. Within Europe, a large consortium of academic and industrial partners (EUROTAPES) has been collaborating to advance in these demanding challenges. In this presentation, several topics related to the recent progress in the different aspects covered by the project will be presented with emphasis on the solution chemistry approach as a bottom-up strategy to reduce the figure of merit cost / performance of the conductors. On one hand, I will report on the efforts in increasing the robustness of the ABAD coated conductor architecture and, particularly, on the progress on using Ink Jet Printing to produce multilayered structures with high total critical currents. On the other hand, different approaches related to achieving nanostructured superconductors with enhanced flux pinning and high magnetic field performances will be also presented. Particularly, a novel path towards nanostructured coated conductors based on colloidal solution precursors will be reported. The YBCO nanocomposite films include $BaZrO_3$ or $BaHfO_3$ as second phase randomly distributed nanoparticles within an epitaxial matrix. The correlation between atomic scale defects, the nanoscale strain, evaluated from X-ray diffraction line broadening and from HRTEM and STEM, and vortex pinning efficiency at different temperatures and magnetic fields will be analyzed. Our work stresses that CSD is a bottom-up approach with a strong potential to create cost-effectively coated conductors with outstanding performances for a new generation of magnets, motors and generators, fault current limiters and cables.

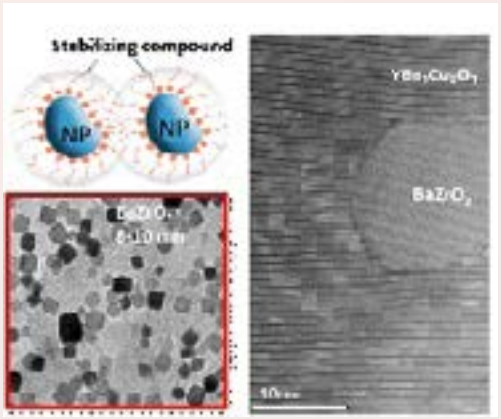


Figure: Colloidal nanoparticles of $BaZrO_3$ prepared by solution chemistry used to grow $YBa_2Cu_3O_7/BaZrO_3$ superconducting nanocomposites.

Recent Publications

- X Obradors, T Puig (2014) Coated conductors for power applications: materials challenges. Supercond. Science Technology 27(12):1-17.
- A Llordés, A Palau, J. Gázquez, M Coll, R Vlad et. al. (2012) Nanoscale strain-induced pair suppression as a vortex pinning mechanism in high-temperature superconductors. Nature Materials. 11:329-336.
- P Cayado, K De Keukeleere, A Garzon, L Perez Mirabet, A. Meledin et. al. (2015) Epitaxial $YBa_2Cu_3O_7$-x nanocomposite thin films from colloidal solutions. Supercond. Science Technology. 28(12).
- J Gazquez, R Guzman, R Mishra, E Bartolomé, J Salafranca et. al. (2016) Emerging diluted ferromagnetism in high-TC superconductors driven by point defect clusters. Advanced Science 3(6):1500295
- P Cayado, C F Sánchez-Valdés, A Stangl, M Coll et. al. (2017) Untangling surface oxygen exchange effects in $YBa_2Cu_3O_6$+x thin films by electrical conductivity relaxation. Phys. Chem. Chem. Phys. 19(21):14129-14140

Biography

Xavier Obradors is a Research Professor and Director of the Institute of Materials Science of Barcelona (CSIC). His scientific interests include materials preparation with controlled micro/nano structures and the comprehension of the physical mechanisms underlying the superconducting, magnetic and electronic properties of nanostructured materials, particularly complex oxides. He has published more than 490 articles (> 9600 citations, h=47), he has filed more than 12 patents and he was one of the creators of the spin-off company OXOLUTIA. He has received several awards: Fellow of Institute of Physics; Doctor Honoris Causa University of Pitesti; ENDESA Novare and National Materials Science Awards; Member of Academy of Sciences and Arts of Barcelona; Narcisi Monturiol Medal of Catalonia; French Academic Palms; City of Barcelona Prize. He served as the Editorial Board of Superconductor Science and Technology and he is Editor of Physica C. He was President of European Society of Applied Superconductivity.

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