YUCOMAT 2014 to be held in September 2014 in Montenegro
www.mrs-serbia.org.rs

YUCOMAT 2014 will be held September 1–5, 2014, in Herceg Novi, Montenegro. The 16th annual conference is organized by the Materials Research Society of Serbia (MRS-Serbia), endorsed by the Materials Research Society (MRS), and under the auspices of the Federation of European Materials Societies (FEMS).

The program features five symposia: Advanced Methods in Synthesis and Processing of Materials, Advanced Materials for High-Technology Applications, Nanostructured Materials, Eco-Materials and Eco-Technologies, and Biomaterials, which comprise 25 invited plenary lectures by leaders in the field. In addition, the conference features oral and poster presentations, a tutorial, a synthesis and characterization equipment exhibition, a cocktail party, and Wednesday and Thursday afternoon excursions.

Awards will be given for the best oral and poster presentation (preferably members under 35 years of age) and for highly rated PhD theses defended since the last conference. Awarded researchers are granted free registration at the next YUCOMAT conference.

Poster abstracts will be accepted until August 25, 2014.

More information can be accessed from the conference website www.mrs-serbia.org.rs or by contacting Aleksandra Stojičić, Conference Secretary, Materials Research Society of Serbia, P.O. Box 433, 11000 Belgrade, Serbia; tel. +381 (11) 2185-437; 2636-994; or email yucomat@mrs-serbia.org.rs.

2nd International Conference on Bioinspired and Biobased Chemistry & Materials to be held in October 2014 in France www.nice2014-conference.com

The 2nd International Conference on Bioinspired and Biobased Chemistry & Materials will be held October 15–17, 2014, in Nice, France. This year's conference, chaired by **Frédéric Guittard** of the University of Nice Sophia Antipolis (France), is endorsed by the Materials Research Society (MRS), the European Materials Research Society (E-MRS), and the International Union of Pure and Applied Chemistry (IUPAC).

The program covers three topics—NanoTech, BioTech, and SmartTech—and features over 70 presentations, a poster session, and a social event. Plenary lectures will be given by Nicholas Kotov (University of Michigan, USA) on "Self-organization of nanoparticles terminal and extended assemblies," and Justin Gooding (University of New South Wales, Australia) on "Making silicon a responsive material for biosensing and biolabelling applications."

The conference's aim is to create a cohesive community of scientists, engineers, and managers from different backgrounds in order to promote new ideas and to share innovation and research in the emerging field of bioinspired and biobased chemistry and materials. Some papers will be selected and published in *Pure and Applied Chemistry*, IUPAC's monthly journal.

More information can be accessed from the conference website www.nice2014-conference.com or email contact@nice-conference.com. □

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MRS Communications

www.mrs.org/mrc

2014
Volume 4, Issue 2

The Doping of TiO_2 Nano-Powders with Vanadium for the Reduction of its Band-Gap Reaching the Visible Light Spectrum Region

Majid Ahmadi and **Maxime J-F. Guinel**, University of Puerto Rico, USA

Titanium oxide (TiO_2) nano-particles (NPs) were doped with vanadium using a novel, facile and inexpensive method. The TiO_2 NPs were dispersed in a vanadyl oxalate solution prepared by dissolving vanadium pentoxide (V_2O_5) in oxalic acid. A short heat treatment at 400°C applied to the dried mixture resulted in the doping of TiO_2 with a net measured decrease of its band-gap by about 0.5 eV, making this important semiconductor material usable in the visible light spectrum. DOI: 10.1557/mrc.2014.15

Pseudoelastic Behavior in Open Cell, Conformally Coated Metallic-Carbon Nanotube Turf Composites

Kassiopeia A. Smith, Washington State University, USA; **Mohamad B. Zbib** and **David F. Bahr**, Purdue University, USA; **Maxime J-F. Guinel**, University of Puerto Rico, USA

We demonstrate for the first time a method to fabricate a conformal metallic coating on a vertically aligned carbon nanotube (CNT) array via electrodeposition, creating an open cell composite foam. The foam exhibits highly elastic behavior, approaching the amount of elastic recovery in compression of a pure CNT turf. The combination of an acid pre-treatment prior to electrodeposition along with low voltage plating is used to deposit Ni and Cu, forming core-shell structures on the CNT with metallic webs in between close contacts of CNTs. DOI: 10.1557/mrc.2014.6

Atomistic Interpretation of the Dynamic Response of Glasses

JongDoo Ju and **Michael Atzmon**, The University of Michigan, USA

Using detailed information on the spectrum of shear transformation dynamics previously obtained from low-strain, quasi-static anelastic relaxation in a metallic glass, the corresponding response to a cyclic force is calculated, and prevailing analysis approaches are evaluated. It is shown that the time-temperature superposition principle does not resolve the distribution of activation energies for shear transformations. The distribution of shear transformation zone sizes explains the microscopic mechanisms of both slow (α) and fast (β) relaxations, and the fact that the former are irreversible. These results suggest the need to re-evaluate past interpretations of dynamic behavior of glasses. DOI:10.1557/mrc.2014.12

PROSPECTIVES ARTICLE

Self-assembled Vertical Heteroepitaxial Nanostructures: From Growth to Functionalities

Heng-Jui Liu, **Wen-I Liang**, and **Ying-Hao Chu**, National Chiao Tung University, Taiwan; **Haimei Zheng**, Lawrence Berkeley National Laboratory, USA; **Ramamoorthy Ramesh**, University of California, Berkeley, USA

Self-assembled vertical heteroepitaxial nanostructures (VHN) in the complex oxide field have fascinated scientists for decades because they provide degrees of freedom to explore in condensed matter physics and design coupled multifunctionlities. Recently, of particular interest is the perovskite-spinel based VHN, covering a wide spectrum of promising applications. In this review, fabrication of VHN, their growth mechanism, control and resulting novel multifunctionalities are discussed thoroughly, providing researchers a comprehensive blueprint to construct promising VHN. Following the fabrication section, the state-of-art design concepts for multifunctionalities are proposed and reviewed by suitable examples. By summarizing the outlook of this field, we are excitedly expecting this field to rise with significant contributions ranging from scientific value to practical applications in the foreseeable future. DOI:10.1557/mrc.2014.13

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Guidelines in Predicting Phase Formation of High-Entropy Alloys

Y. Zhang and **Z.P. Lu**, University of Science and Technology Beijing, China; **S.G. Ma**, Taiyuan University of Technology, China; **P.K. Liaw** and **Z. Tang**, The University of Tennessee, USA; **Y.Q. Cheng**, Oak Ridge National Laboratory, USA; **M.C. Gao**, National Energy Technology Laboratory and URS Corporation, USA

With multiple elements mixed at equal or near equal molar ratios, the emerging, high-entropy alloys (HEAs), also named multi-principal elements alloys (MEAs), have posed tremendous challenges to materials scientists and physicists, e.g., how to predict high-entropy phase formation and design alloys. In this paper, we propose some guidelines in predicting phase formation, using thermodynamic and topological parameters of the constituent elements. This guideline together with existing ones will pave the way toward the composition design of MEAs and HEAs, as well as property optimization based on the composition-structure-property relationship. DOI:10.1557/mrc.2014.11

Ion Modulated Transistors on Paper Using Phase Separated Semiconductor/Insulator Blends

Fredrik Pettersson, **Ronald Österbacka**, **Tommi Remonen**, **Yanxi Zhang**, **Saara Inkinen**, **Carl-EricWilén**, **Roger Bollström**, **Martti Toivakka**, **Anni Määttänen**, **Petri Ihalainen**, and **Jouko Peltonen**, Åbo Akademi University, Finland; **Janne Koskela** and **Ari Kilpelä**, University of Oulu, Finland

We have used phase separated poly(3-hexyltiophene) (P3HT)/poly(L-lactic acid) (PLLA) blends to fabricate low-voltage ion modulated transistors on a rough paper substrate. The semiconductor and insulator are mixed together in a solution and spin casted onto the paper substrate. Due to their different solubilities and surface energies the P3HT and PLLA will phase separate vertically during the spinning process creating a thin layer of semiconductor on top of the insulator. This thin semiconductor layer, difficult to achieve by other means on an absorbing paper substrate, creates faster ion-modulated transistors. Using this approach we have created ring-oscillators on paper oscillating at 5 Hz. DOI:10.1557/mrc.2014.10

Dielectric Behavior Related to TiOx Phase Change to TiO_2 in TiO_x/Al_2O_3 Nanolaminate Thin Films

Geunhee Lee, University of Texas at Dallas and University of Puerto Rico, USA; **Ram S. Katiyar**, University of Puerto Rico, USA; **Bo-Kuai Lai**, Lake Shore Cryotronics, USA; **Charudatta Phatak**, Argonne National Laboratory, USA; **Orlando Auciello**, University of Texas at Dallas, USA

We previously demonstrated that TiO_x/Al_2O_3 nanolaminates (TAO NL) exhibit abnormally high-dielectric constant k (800–1000), due to Maxwell–Wagner polarization, via charge accumulation at insulating Al_2O_3/semiconducting TiO_x interfaces. Here, we report TAO NL dielectric properties related to TiO_x phase change in TiO_x (0.9 nm)/Al_2O_3 (0.1 nm) NL. High-resolution transmission electron microscopy shows amorphous TiO_x phase change to crystalline anatase TiO_2 due to free-energy minimization. The phase change induce reduction in leakage current and dielectric loss ($J = 10^{-2}$ to 10^{-4} A/cm^2, $\tan\delta = 10$ to 10^{-1}), still with $k \sim 600$ up to MHz, compared to amorphous TAO NLs. DOI:10.1557/mrc.2014.14

Control of Thermal and Optoelectronic Properties in Conjugated Poly(3-alkylthiophenes)

Victor Ho, **Bryan S. Beckingham**, and **Hoi H. Ng**, University of California, Berkeley, USA; **Rachel A. Segalman**, University of California, Berkeley and Lawrence Berkeley National Laboratory, USA

The optoelectronic and thermal properties of conjugated polymers are frequently tuned via synthetic modification of the conjugated unit. It is also well-known that these properties are inherently tied to the crystal structure, a factor which is difficult to predict upon slight chemical modification. We show that the crystal structure of 3-alkylthiophene random copolymers can be controlled, which in turn affects the optoelectronic properties. Furthermore, we show that the melting transitions smoothly vary between that of the two homopolymers. As such, the composition of copolymers is a convenient handle to predictably control the thermal properties, crystalline morphology, and optoelectronic properties simultaneously. DOI: 10.1557/mrc.2014.9

https://doi.org/10.1557/mrs.2014.160 Published online by Cambridge University Press

Recent Titles

from the Materials Research Society and Cambridge University Press

Book Collection

Biological Materials Science
Biological Materials, Bioinspired Materials, and Biomaterials

AUTHORS: Marc André Meyers and Po-Yu Chen
ISBN: 9781107010451
List Price: $99.00
MRS Member Discount Price: $79.00

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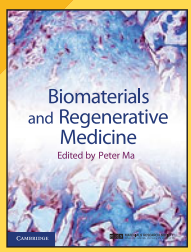

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EDITOR: Peter Ma
ISBN: 9781107012097
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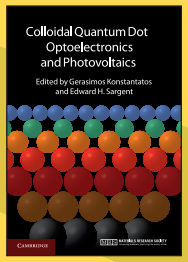

Colloidal Quantum Dot Optoelectronics and Photovoltaics

EDITORS: Gerasimos Konstantatos and Edward H. Sargent
ISBN: 9780521198264
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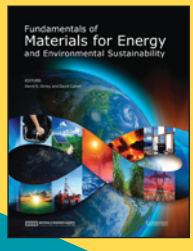

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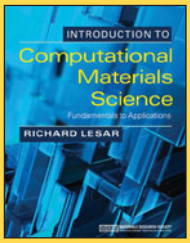

Introduction to Computational Materials Science
Fundamentals to Applications

AUTHOR: Richard LeSar
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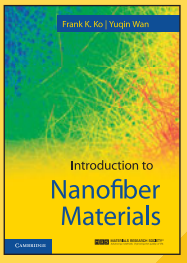

Introduction to Nanofiber Materials

AUTHORS: Frank K. Ko and Yuqin Wan
ISBN: 9780521879835
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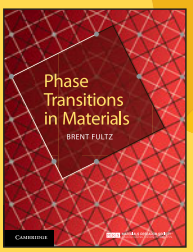

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AUTHOR: Brent Fultz
ISBN: 9781107067240
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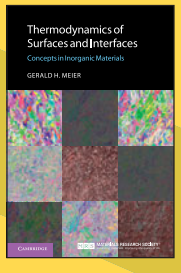

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