E-MRS 2010 Spring Meeting

Technical sessions: June 7-11, 2010
Exhibit: June 8-10, 2010
Congress Center - Place de Bordeaux - Wacken, Strasbourg, France

The exciting scientific program highlights advances in international materials research and key novel applications.

Conference Chairpersons:

Ian W. BOYD
Electronic & Electrical Eng.
London Centre for Nanotechnology
University College, London
U.K.
Tel: 44 20 7679 7307, 7302
Fax:44 20 7388 9325, 7387
i.boyd@ucl.ac.uk

Thomas K. LIPPERT
Material Group - Paul Scherrer Institut
CH-5232 Villigen PSI
SWITZERLAND
Tel: 41 (0)56 310 4076
Fax:41 (0)56 310 2688 (or 2199)
thomas.lippert@psi.ch

Giovanni MARLETTA
Università di Catania
Dip. di Scienze Chimiche
Viale Andrea Doria 6
95125 Catania
ITALY
Tel: 39 095 738 5130
Fax:39 095 580 138
gmarletta@unict.it

Rodrigo MARTINS
Materials Science Department &
I3N/CENIMAT
FCT – UNL
2829 516 Caparica
PORTUGAL
Tel: 351 21 294 8524
Fax:351 21 294 1365
rm@uninova.pt

PLENARY SESSION *(Wed. afternoon - June 9)*

Preliminary program

BIOMATERIALS, SENSORS & SURFACES

A From embedded sensors to sensorial materials
B Functional Biointerfaces
C Peptide-based materials: from nanostructures to applications 10
D Surface modifications of diamond and related materials

ELECTRONIC, PHOTONIC & OPTOELECTRONIC

E Frontiers of multifunctional oxides
F Wide Bandgap Cubic Semiconductors : from growth to devices
G Physics and Applications of Novel Gain Materials based on III-V-N compounds
H Post-Si CMOS electronic devices: the role of Ge and III-V materials
I Advanced Silicon Materials Research for Electronic and Photovoltaic Applications II
J Silicon-based nanophotonics
K Rare earth doped materials for optical based technologies

CARBON AND ENERGY

L Carbon -or Nitrogen-Containing Nanostructured Composite Films
M Thin Film Chalcogenide Photovoltaic Materials

N Nuclear materials IV
O Solid State Ionics: Exploring chemical and structural complexity of novel ionic conductors
P Science and Technology of Nanotubes, Nanowires and Graphene

METHODS AND PROPERTIES

Q Quantitative Electron Microscopy for Research and Industry
R Laser Processing and Diagnostics for Micro and Nano Applications
S Shape Memory Materials for Smart Systems III
T Advanced Hybrid Materials: stakes and concepts

TUTORIAL

Young Scientist Tutorial on Characterisation techniques for Thin-Film Solar Cells - *Friday afternoon June 11th*

European Materials Research Society
23 Rue du Loess - BP 20 - 67037 Strasbourg Cedex 02 - France - Phone:+33-(0)3 88 10 63 72 - Fax:+33-(0)3 88 10 62 93 - emrs@emrs-strasbourg.com

2010 B: Functional biointerfaces

The symposium addresses the growing interest of materials scientists in the creation, characterization, and control of processes at functional biointerfaces, i. e, the interfaces between biomolecules, cells, tissues or complex biological systems with other materials. The aim of this symposium is to exchange information about the fundamental understanding, characterization, control and engineering of these interfaces in a thought provoking, stimulating atmosphere. This is not only because of the intellectual challenges of the exciting interdisciplinary field of materials science but also because materials scientists, physicists, chemists, biologists, engineers and medical doctors are facing more and more situations where materials are confronted with challenging biological environments. Therefore, a need exists to develop and spread knowledge in this area. The aim of this symposium is, therefore, to address the need to design, create, characterize and test functional biointerfaces and to develop structure-property relationships for these functional biointerfaces.

Hot topics to be covered by the symposium:
Subject areas of this symposium include but are not limited to: biointerfaces of medical implants; proteins, polysaccharids and other biomolecules at biointerfaces; engineered micro and nanoenvironments of cells for regenerative medicine; structuring and functionalisation of biointerfaces; molecular cell biology at biointerfaces; antimicrobial biointerfaces; biomineralization at biointerfaces; nanoparticle, nanotube and nanofibre interfaces; gene and drug delivery at biointerfaces; therapy and probes in bioenvironments; sensors and devices; pathogen detection at biointerfaces; characterization of biointerfaces including probe methods; biointerfaces in nature and bioinspired biointerfaces; computational modelling of biointerfaces.

Target groups of the symposium:
Materials scientists, physicists, chemists, biochemists, engineers, biologists, microbiologists, pharmaceutical scientists, and medical professionals from fundamental and applied research as well as from industry and clinical backgrounds.

List of invited speakers:
- David M. Lynn, University of Wisconsin-Madison, USA
- Hsiao-hua (Bruce) Yu, RIKEN Advanced Science Institute, Japan
- Raphaël Lévy, University of Liverpool, UK
- Holger Schönherr, University of Siegen, Germany
- Roy Bar-Ziv, Weizmann Institute of Science, Israel
- Xingyu Jiang, Beijing, China
- Markus Buehler, MIT, USA

Scientific committee members:
- Klaus D. Jandt
- Giovanni Marletta
- Christine Ortiz
- Alexander Bershadsky
- Kaiyong Cai

The organizers do not plan to publish proceedings for this symposium. Selected papers presented at this symposium will be invited as regular submissions (full peer-review process) to the „Advanced Biomaterials" section of the international scientific journal "***Advanced Engineering Materials***" by Wiley-VCH. The deadline for on-line manuscript submission via http://mc.manuscriptcentral.com/adbi is 15 October 2010.

Symposium organizers:

Klaus D. Jandt *(Main organizer)*
FADM, Chair in Materials Science
Director of the Institute of Materials Science and Technology (IMT)
Friedrich-Schiller-University Jena
Löbdergraben 32
D-07743 Jena
Germany
k.jandt@uni-jena.de

Giovanni Marletta
President of Interuniversity Consortium on Large Interphase Systems (CSGI)
Dip. di Scienze Chimiche
Università di Catania
Viale Andrea Doria 6
95125 Catania
ITALY
gmarletta@unict.it

Christine Ortiz
Massachusetts Institute of Technology
USA
cortiz@mit.edu

Alexander Bershadsky
Weizmann Institute of Science
Israel
alexander.bershadsky@weizmann.ac.il

Kaiyong Cai
Chongqing University
China
kaiyong_cai@cqu.edu.cn

inverted microscopy study demonstrated that fluorescent magnetite nanoparticles are readily endocytosed by AtT20 cells with high efficiency. Our findings open up the possibility that magnetite nanoparticles can be used as drug carrier for the treatment of undifferentiated neurodegenerative diseases.

add to my program (close full abstract)

10:20 Osteoblast Compatibility of Biodegradable Poly(butylene Succinate) Modified by Various Gas PIII

Authors : Huaiyu Wang, Wenjun Zhang, Paul K. Chu Department of Physics & Materials Science, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China

Resume : Poly (butylene succinate) (PBSu) is a kind of novel biodegradable aliphatic polyester synthesized by copolycondensation. It possesses good processability, superior mechanical properties, harmless degradation products (CO2 and H2O), and adjustable degradation rate. However, the insufficient osteoblast compatibility has greatly hampered wider applications of this material as bone-replacement materials. Plasma immersion ion implantation (PIII) is one of the surface modification method which is prominent for its simple operations and the non-light-of-sight characteristic. In this manuscript, NH3 and H2O PIII is conducted to modify PBSu surface respectively. X-ray photoelectron spectroscopy (XPS) and contact angle measurements were carried out to reveal the surface characteristics of the treated and control specimens. The in vitro effects of the materials on seeded osteoblasts were detected by cell viability assay, ALP activity test, and real-time PCR analysis. The results showed that both modified samples exhibit better compatibility to osteoblasts than the untreated one. However, from the aspect of osteogenic gene expression of osteoblasts seeded, NH3 PIII PBSu is much better than H2O PIII PBSu. In other words, NH3 PIII is a better method than H2O PIII to modify PBS substrates for being used as bone-replacement materials.

115

add to my program (close full abstract)

10:40 Coffee Break

11:00 Engineered Synthetic Viruses for Tissue Regenerating Bionanomaterials

Authors : Seung-Wuk Lee, So-Young Yoo, Woo-jae Chung

Resume : We have developed novel nanofiber-like synthetic viruses which can control and guide cell behavior for tissue engineering materials using genetically engineered M13 bacteriophage (viruses). Filamentous M13 phage have several qualities that make them attractive candidates for use as building blocks in tissue engineering scaffolds. The M13 phage has a monodisperse, long-rod shape that enables its self-assembly into directionally ordered liquid crystalline structures. Through genetic engineering, a high-density array of peptide-based signaling molecules and therapeutic materials can simultaneously be displayed on its major and minor coat proteins. We have engineered M13 bacteriophage to display various signaling peptide that promote cell interaction (IKVAV, RGD) on all 2700 copies of major coat proteins. We will demonstrate that such engineered phage can self assemble into directionally organized structures, which in turn dictate the alignment and direction of cell growth in 2D and 3D tissue engineering matrices. We will also introduce how to identify the novel signaling peptide using viral tissu engineering approaches. The success of our novel virus-based tissue regenerating materials will enable to manipulate cell behavior at the molecular level and regenerating various tissues, and possibly lead to the discovery of cures for challenging diseases such as spinal cord injuries.

116

add to my program (close full abstract)

11:20 Control of bioactivity in sol-gel derived porous glasses : from mesoporous glasses to glass foams

Authors : J. Soulié [1,2,3], J. Lao[1], L. John[1,2,3], E. Jallot[1], J.M. Nedelec [2,3] [1] Clermont Université, Université Blaise Pascal, CNRS/IN2P3, Laboratoire de Physique Corpusculaire, BP 10448, F-63000 CLERMONT-FERRAND, France [2] Clermont Université, ENSCCF, Laboratoire des Matériaux Inorganiques, BP 10448, F-63000 CLERMONT-FERRAND [3] CNRS, UMR 6002, LMI, F-63177 AUBIERE

Resume : Among the various biomaterials used as bone substitutes or as prosthesis coatings in orthopedic surgery, bioactive glasses have attracted considerable interest. When in contact with living tissues, dissolution and precipitation take place at the material / biological medium interface, and this leads to the formation of a phosphocalcic layer. This apatite-like layer is used