

## BIOMATERIALS

K

### Bioinspired and biointegrated materials as new frontiers nanomaterials VII

The Symposia series I – VI on Bioinspired and Biointegrated Materials as New Frontier Nanomaterials has been running from 2009 to 2016, with a total of 1317 Presenters, featuring inspiring presentations on rapidly-developing bio-nanotechnologies for next generation nanomaterials, nanosystems and robotic nanodevices.

The VII edition of the Symposium, to be held on May 22-26 2017 in Strasburg (France), is aimed to give an overview of recent development on fundamentals and innovative applications of bio-nanotechnologies, with a special focus on biomaterials engineering and frontier nanomaterials based on emerging concepts for preparing, characterizing and applying bioinspired and biomimetic materials.

#### Scope:

The Symposium, boosting an interdisciplinary vision, welcomes researchers active in materials science, chemistry, physics, biotechnology and nanomedicine. Submissions reporting on interdisciplinary research efforts, especially those exploring new and emerging concepts, as well as more-developed ideas that are breaking down barriers in biomedical research, are encouraged.

The Symposium will also be the opportunity to bring together researchers from several associated international projects including the COST Actions (MP 1301 NEWGEN & CA 15107 MultiComp) and EU HORIZON 2020 FET Open Programs (LiNaBioFluid), HORIZON 2025 started Programs

#### Topics to be covered by the symposium:

- Cells, intracellular membranes & tissues bioscience, engineering and 3D/4D imaging
- Smart scaffolds for cell seeding and soft & bone tissue bioengineering
- Chemical and biological synthesis of biomimetic molecules and supramolecular aggregates,
- Stimuli responsive systems, including motors, rotors, switches, pumps, receptors, light emitters, energy harvesting devices at nanoscale
- New nanomaterials for smart bioresponsive interfaces with biological signaling
- Bioinspired synthesis of inorganic nanoparticles for nanomedicine
- Carbon multifunctional 2D & 3D architectures, structure-development of graphene, graphene oxide, nanocarbons
- Biosensing & biological signaling by interfaces engineering
- Electronics and photonics based on biomolecules, supramolecular assemblies, biopolymers, including nucleic acids, peptides, proteins, etc...

***The participation of young investigators is strongly encouraged, to provide the most effective and exciting environment for the discussion of the latest, cutting edge results.***

***The E-MRS Hq and Symposium K support Young Investigators through the E-MRS Graduate Students Awards Prizes and a special support from the Symposium K's budget fund (cf. bottom of page for more details).***

**Projects for Focused Sessions from May 22 to May 26, 2017:**

***I. Cell and Tissue Nature Science, Growth at Surface/Interface, Inspired Repair & 3D/4D Imaging.***

***The Special Session & Young Investigator Forum are dedicated to the 2016 Nobel Laureate in Physiology or Medicine Professor Yoshinori Ohsumi "for his discoveries of mechanisms for autophagy".***

Keynote Presentations:

- Tomas Webster Northeastern University, USA
- Osamu Suzuki, Tohoku University, Japan;
- Paula E. Colavita, Trinity College Dublin, Ireland;
- Yoshikatsu Akiyama, Tokyo Women's Medical University, Japan
- Masaru Tanaka, Kyushu & Yamagata Universities;
- Karsten Haupt, Compiègne University of Technology, France

START AT	SUBJECT	NUM.	ADD
17:40	<p><b>Extracellular electron transfer from aerobic bacteria to Au-doped TiO<sub>2</sub> nanotubes in the dark</b></p> <p>Authors : Guomin Wang (1), Hongqing Feng (1,2), Ang Gao (1), Weihong Jin (1), Qi Hao (1), Xiang Peng (1), Wan Li (1), Guosong Wu (1), Paul K Chu (1)</p> <p>Affiliations : (1) Department of Physics and Materials Science, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China; (2) Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences and National Center for Nanoscience and Technology (NCNST), Beijing 100083, P. R. China</p> <p>Resume : Titania doped with noble metal nanoparticles exhibits enhanced photocatalytic killing of bacteria under light illumination due to the localized surface plasmon resonance (LSPR) property. Recently, it has been reported that doping with Au or Ag can also endow TiO<sub>2</sub> with antibacterial ability in the absence of light. However, the underlying mechanism is still far from understood. In this work, the antibacterial mechanism of Au-doped TiO<sub>2</sub> nanotubes (Au@TiO<sub>2</sub>-NT) in the dark environment is studied and a novel EET from the aerobic <i>S. aureus</i> to the Au@TiO<sub>2</sub>-NT surface is discovered, which forms a ? bacteria-current? similar to the photocurrent on the electrochemical workstation. Electron-light region in the bacteria structure is also observed under transmission electron microscopy (TEM), supporting the EET phenomena mentioned above. The physiological changes in intracellular components leakage and ROS production are also studied to investigate the detailed bacterial killing process. Our results indicate that although the EET-induced bacteria current is similar to the LSPR-related photocurrent, the former takes place without light and no reactive oxygen species (ROS) are produced during the process. The EET is also different from what are commonly attributed to microbial fuel cells (MFC) because it is dominated mainly by the materials surface, but not the bacteria, and the environment is aerobic. EET on the Au@TiO<sub>2</sub>-NT surface kills <i>Staphylococcus aureus</i> but if it is combined with special MFC bacteria, the efficiency of MFC may be improved significantly.</p>	<b>K.PV.7</b>	☆
17:40	Biomedical nanostructure mediated physical signal to regulate stem cell differentiation for tissue engineering applications	<b>K.PV.8</b>	☆
17:40	Design of hybrid nanomaterial with significant superoxide dismutase activity	<b>K.PV.10</b>	☆
17:40	Biocomposites based on crosslinked chitosan for encapsulation of polyphenols	<b>K.PV.11</b>	☆
17:40	Design of Nano biohybrids based on silver nanoparticles and herbal extracts	<b>K.PV.12</b>	☆