

ICCCI 2018

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*The 6th International Conference on the
Characterization and Control of Interfaces
for High Quality Advanced Materials
and
the 54th Summer Symposium on
Powder Technology*

Program and Abstracts



**Kurashiki, Japan
July 9–12, 2018**

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Control of Interfaces for High Quality Advanced Materials
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Conference Information

1. Aims and Scope

Interfaces are critically important to a broad spectrum of materials and technologies. In 2003, the first International Conference on Characterization and Control of Interfaces for High Quality Advanced Materials (ICCCI2003) established an international forum for interface science and technology. Interest and participation doubled in 2006, 2009, 2012 and 2015 at the second, third, fourth and fifth International Conferences (ICCCI2006, 2009, 2012 and 2015) respectively. In 2018, the sixth International Conference (ICCCI2018) will continue the discussion on interface characterization and control to design and manufacture high quality advanced materials. Additionally, an industrial exhibition by multinational corporations will complement the technical sessions. At ICCCI2018, interface characterization and control technology for nano-scale to micro-scale materials synthesis, powder processing, composite processing, joining, and to control airborne particulates will be addressed by scientists and engineers from academia, industry, and national laboratories. Conference topics include:

Session A: Interface Characterization and Control for Nanoparticles and Powders (54th Summer Symposium on Powder Technology)

- Solid-liquid interfaces
- Composite interfaces
- Interface characterization techniques
- Interface control for processing
- Control and design of interfaces in suspensions

Session B: Smart Processing Technology

- Advanced materials: ceramics, metals, polymers, composites, porous materials etc.
- Microsystems
- Nanotechnology
- Novel manufacturing: 3D printing etc.
- Advanced joining and welding technology

Session C: International Symposium in Honor of Prof. Olivera Milosevic

Session D: Energy and Environment

- Batteries
- Fuel cells
- Solar cells
- Biomass, Coals
- Recycling
- PM2.5
- Nanorisk

Session E: Material Design and Evaluation

- Bio-materials
- Chemicals and pigments
- Electronic materials
- Pharmaceutical
- Engineering materials
- Microstructure evaluation
- Evaluation of material properties

2. Supporting Organizations and Sponsors

Organized by

The Society of Powder Technology, Japan

Co-Sponsors

Hosokawa Powder Technology Foundation

International Comminution Research Association

Japan Science and Technology Agency

Japan Welding Society

Joining and Welding Research Institute, Osaka University

Kao Corporation

Smart Processing Society for Materials, Environment & Energy

The 124th Committee on Advanced Ceramics, Japan Society for the Promotion of Science

The American Ceramic Society

The Ceramic Society of Japan

The Japan Institute of Energy

The Japan Institute of Metals and Materials

The Japan Society on Adsorption

The Society of Chemical Engineers, Japan

Yamanashi Prefecture

Material Research Society of Serbia

3. Conference Venue

Kurashiki Royal Art Hotel

3-21-19 Achi, Kurashiki, Okayama 710-0055, Japan

Tel: +81-86-423-2400, Fax: +81-86-423-2401

www.royal-art-hotel.co.jp

Room II

Session C: International Symposium in Honor of Prof. Olivera Milosevic

08:00–10:00 Chair: Kevin G. Ewsuk

08:00–08:30 1-II-C-01 INVITED

Design and processing of photoresponsive hierarchical nanomaterials using innovative synthesis routes

O. Milosevic

Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Serbia

08:30–09:00 1-II-C-02 INVITED

Interfaces in electronic packaging: metallurgical challenges in miniaturization

F. Hodaj

Grenoble Institute of Technology, France

09:00–09:30 1-II-C-03 INVITED

Synthesis and characterization of functional ceramic materials at the nano- and microscale with enhanced properties

G. Flores-Carrasco^{1,2}, A. Urbietá³, P. Fernández³, O. Milosevic⁴, M.E. Rabanal¹

¹Carlos III University, Spain, ²Meritorious Autonomous University of Puebla, Mexico,

³Complutense University of Madrid, Spain, ⁴Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Serbia

09:30–10:00 1-II-C-04 INVITED

Characterization of defects in ceramics

K. Uematsu

Uematsu Consulting for Ceramic Technology, Japan

10:00–10:20

Coffee break

10:20–12:00 Chair: Olivera Milosevic

10:20–10:50 1-II-C-05 INVITED

Synthesis of nanocarbons and ilmenites nanoparticles using super-high-energy ball milling

S. Ohara

Osaka University, Japan

10:50–11:10 1-II-C-06 INVITED

Photocatalytic efficiency of TiO₂/Ag nanoparticles modified cotton fabric

M. Milošević, M. Radoičić, Z. Šaponjić

University of Belgrade, Serbia

11:10–11:30 1-II-C-07 INVITED

Magnetically recoverable photocatalysts based on metal oxide nanostructures (Fe and Zn)

L. González^{1,2}, L. Muñoz-Fernandez¹, G. Flores-Carrasco^{1,3}, O. Milosevic⁴, G. Salas², M.E. Rabanal¹

¹Carlos III University, Spain, ²IMDEA Nanociencia, Spain, ³Meritorious Autonomous University of Puebla, Mexico, ⁴Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Serbia

12:00–13:20

Photo and Lunch

I-II-C-01 INVITED

08:00–08:30, July 10, Room II

Design and Processing of Photoresponsive Hierarchical Nanomaterials using Innovative Synthesis Routes

Olivera Milosevic

Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Serbia

Tremendous technological development and aroused energy and environmental problems forced the demand for novel materials with better functionalities. Hierarchical structures, having well defined compositional, phase and morphological features, organized as the assemblage of primary units with high surface-to-volume ratio, play an important role in advanced materials design. Especially, the building of complex hierarchical structures exhibiting tailored inorganic/organic and metal oxide/metal hybrid interfaces might be of special importance for the creation of advanced nanostructured materials having either improved or novel characteristics that bridges various scientific areas for the future diverse technological applications in catalysis, optics, energy, life science etc. Applying the bottom-up building blocks approaches in a dispersed system, it is possible to create the hierarchical structures having different morphologies, starting from aqueous, organic or colloidal precursor solutions. The hydrothermal/solvothermal method, featured by the superheated solvents and the autogenic pressure in closed system, is shown to be one of the simplest techniques for the synthesis of 1D hierarchical structure in a controlled manner. Moreover, the hot wall aerosol processing, provided by high heating and cooling rates, short residence time and high surface reaction, refers to the synthesis of spherical three-dimensional (3D) nanostructured particles with uniformly distributed components and phases. The particle's composite inner structure, representing an assembly of nanosized primary units, opens the possibility for particle surface modification and functionalization.

Due to exceptional optical properties emphasizing their application for light harvesting and photocatalytic applications, the examples from some wide band gap oxides including hierarchically organized hybrid TiO_2 and ZnO nanoparticles as well as both down and up-conversion energy-saving luminescent materials with improved efficiency for photonic and biological applications ($\text{Y}_2\text{O}_3:\text{Eu}, \text{Yb}/\text{Er}/\text{T}/\text{Hm}$, $\text{Y}_2\text{O}_3:\text{Eu}@\text{Ag}$, $(\text{Y}_{1-x}\text{Gd}_x)_2\text{O}_3:\text{Eu}$, $(\text{NaYF}_4:\text{Yb}/\text{Er})@\text{EDTA}/\text{PEG}/\text{PVP}/\text{PLGA}$), are considered. Employing a variety of analytical techniques, like XRPD, FE-SEM, analytical and high resolution transmission electron microscopy (TEM, HR-TEM), scanning tunneling electron microscopy (STEM), nanotomography, UV-Vis diffusive reflectance (UV-Vis DRS), Fourier transform infrared (FTIR) and Raman spectroscopy, photocatalytic and fluorescence measurements, to determine the new materials structures, the opportunities of the aerosol and hydro(solvo) thermal routes for the synthesis of novel hierarchically and hybrid assembled structures and nanocomposites are explored. The obtained results offer possible routes for the synthesis of hierarchically structured nanomaterials with tunable structure, morphology and functional properties and better understanding the structure-property relationship.