

# Preface

The 2<sup>nd</sup> International Symposium on Inorganic and Environmental Materials (ISIEM 2013) was held from October 27 to October 31, 2013, at Campus de Beaulieu, University of Rennes 1, Rennes, France. The ISIEM 2013 was organized by the Society of Inorganic Materials of Japan (SIMJ) and the University of Rennes 1 (UR1) under the auspices of fifteen scientific societies or associations<sup>1</sup> and was supported by seven academic<sup>2</sup> and six industrial<sup>3</sup> partners.

As chairmen of the French and Japanese Local Executive Committees, we would like to sincerely thank the Chairman Prof. Itatani, the International Advisory Board and Executive Committee members, all Invited Speakers, Delegates and Students for the enthusiasm they have shown for making ISIEM 2013 a great success. It was a great honour and a great pleasure for us to organize the ISIEM 2013.

We wish to sincerely thank the President of the University of Rennes 1, Prof. Cathelineau for providing us with the resources, staff and facilities of the university, the Mayor of the city of Rennes M. Delaveau and his team to welcome us in the very beautiful city hall of Rennes, our academic partners<sup>2</sup>, as well as the industrial sponsors<sup>3</sup> for their very important support. Many people have contributed to the creation and the success of this 2<sup>nd</sup> ISIEM and we would like to warmly thank all of them, and particularly Prof. Haneda for starting the discussion about the organization of ISIEM at Rennes, the members of the editorial guest committee and all the referees for their hard work to build this book, and the administration and students from the University of Rennes 1 for giving their best to the participants. Organizing such an event is an exciting experience full of emotions.

This event attracted around 300 participants from 13 different countries all over the world with of course a large majority of participants who come from Japan (53%) and France (39%). With its 4 plenary, 4 keynote and 34 invited speakers, 112 oral presentations and 101 posters, all participants presented a vibrant image of the inorganic material science all over the world. The participants provided a global representation of inorganic chemistry and expertise in a wide range of disciplines presented in this book (Nanotechnology, Science and Technology of Inorganic Materials, Electric Current Assisted Sintering, Functional Materials, Thermoelectric Materials, Energy and Sustainable Materials, Environmental related Materials and Cement/Gypsum/Lime). During the conference, the presence of almost 30% of students showed the good vitality of this scientific field. Inorganic chemistry today is actively used in almost all domains of Materials Science and the program of this event and book offer space and time to make these different domains visible. Given the high quality of the oral presentations and posters presented at ISIEM 2013, we can state that this event was a great scientific achievement.

We also consider this event to be a human success, with a rich social program (a welcome party with a Celtic harp performance and art exhibition (illuminated manuscripts and calligraphy), a reception at the city hall, an excursion to the « Wonder of the Western World » Mont-St-Michel and a conference banquet) allowing numerous exchanges and the development of lasting relationships based on mutual trust, which is the foundation of all success.

In closing, the next ISIEM conference will be in Belgium and we would like to invite you to participate. ISIEM conferences have a bright future thanks to all of you.

Best regards

Kazuyuki KAKEGAWA and Fabien GRASSET

Handwritten signature of K. Kakegawa in black ink, featuring a stylized, cursive script.Handwritten signature of Fabien Grasset in black ink, featuring a cursive script.

<sup>1</sup> Australian Ceramic Society, Dutch Ceramic Society, Gypsum Board Association-Japan, Groupe Français de la Ceramique, Japanese Association of Inorganic Phosphorus Chemistry, Japan Cement Association, Japan Lime Association, Japan Plaster of Paris Industrial Association, Japan Society of Powder and Powder Metallurgy, National Institute for Materials Science, Slovak Silicate Society, The Ceramic Society of Japan, The Chemical Society of Japan, The Technical Association of Refractories-Japan, The JSPS 124th Committee on Advanced Ceramics

<sup>2</sup> Centre National de la Recherche Scientifique, Office of Naval Research Global, University of Rennes 1, Rennes Metropole, Region BRETAGNE, CBB Developpement, and STAM-Science and Technology of Advanced Materials.

<sup>3</sup> Saint-Gobain, Air Liquide, Lhoist, Cordouan Technology, Grosseron and JEOL

**Conference Chair:**

**General Chair: Kiyoshi Itatani**

**Co-chair: Kazuyuki Kakegawa and Fabien Grasset**

**International Advisory Board:**

**Australia:**

Jim Low (Curtin Univ.)

Yi-Bing Chen (Monash Univ.)

**China:**

X. M. Chen (Zhejiang Univ.)

Wei Pan (Tsinghua Univ.)

**France:**

Jean-Luc Adam (CNRS – Rennes)

Etienne Duguet (Univ. of Bordeaux)

Thierry Gacoin CNRS - Ecole Polytech., Palaiseau)

Maryline Guilloux-Viry (Univ. of Rennes 1)

Jean-Pierre Landesman (Univ. of Rennes 1)

Antoine Maignan (CRISMAT, CNRS – ENSICAEN)

Francis Maury (CNRS-Toulouse)

Michel Mortier (CNRS - Chimie ParisTech)

Tanguy Rouxel (Univ. of Rennes 1)

Jean-François Tassin (CNRS - Paris)

Philippe Thomas (SPCTS, CNRS - Univ. of Limoges)

Cathie Vix-Guterl (CNRS - Mulhouse)

**Japan:**

Osami Abe (Ibaraki Univ.)

Kohmei Halada (NIMS)

Hajime Haneda (NIMS)

Kiyoshi Itatani (Sophia Univ.)

Kazuyuki Kakegawa (Chiba Univ.)

Kiyoshi Kanamura (Tokyo Metropolitan Univ.)

Takeshi Kawashima (Yoshizawa Lime Industry)

Yoshiyuki Kojima (Nihon Univ.)

Kunihito Koumoto (Nagoya Univ.)

Hideki Monma (Hosei Univ.)

Yusuke Moriyoshi (Hosei Univ.)

Makoto Nanko (Nagaoka University of Technology)

Etsuo Sakai (Tokyo Institute of Tech.)

Yoshio Sakka (NIMS)

Kimihiro Yamashita (Tokyo Medical and Dental Univ.)

Ryoichiro Yamazaki (Yoshino Gypsum)

**Slovakia:**

Zoltan Lences (Slovak Acad. of Sci.)

**South Korea:**

Young-Jo Park (Korea Institute of Materials Sci.)

**Thailand:**

Sutham Srilomsak (Suranaree Univ.)

**The Netherlands:**

Jos Brouwers (Eindhoven Univ. of Tech.)

H. T. (Bert) Hintzen (Eindhoven Univ. of Tech.)

Louis Winnubst (University of Twente)

**USA:**

Christian Dussarrat (Air Liquide corp.)

Zuhair Munir (Univ. of California, Davis)

Steven H. Kosmatka (Portland Cement Association)

Kenji Uchino (Penn State Univ. & Office of Naval Research, USA)

### **Local Executive Committee (Japan):**

**Chairman:** Kazuyuki Kakegawa (Chiba Univ.)

#### **Members:**

Kenjiro Fujimoto (Tokyo Univ. of Science)

Hajime Haneda (NIMS)

Kiyoshi Itatani (Sophia Univ.)

Shigehiro Kawamori (Tamagawa Univ.)

Takeshi Kawashima (Yoshizawa Lime Industry Co., Ltd)

Kazufumi Nakamura (Taiheiyo Cement Corp.)

Hiroyuki Sango (Nihon Univ.)

Ryoichiro Yamazaki (Yoshino Gypsum Co., Ltd)

Katsumi Yoshida (Tokyo Institute of Tech.)

### **Local Executive Committee (France):**

**Chairman:** Fabien Grasset (ISCR, Univ. of Rennes 1)

#### **Members:**

Franck Artzner (IPR, CNRS, Rennes)

Valérie Bouquet (ISCR, Univ. of Rennes 1)

Olivier Cador (ISCR, Univ. of Rennes 1)

François Chevire (ISCR, CNRS, Rennes), webmaster

Stéphane Cordier (ISCR, CNRS, Rennes)

Marc Fourmigué (ISCR, CNRS, Rennes)

Laurent Le Gendre (IETR, Univ. of Rennes 1)

Olivier Hernandez (ISCR, Univ. of Rennes 1)

Franck Tessier (ISCR, CNRS, Rennes)



**Host Organizations:**

**Society of Inorganic Materials, Japan**



**University of Rennes 1, France**



**Institutional sponsors:**



**Industrial sponsors:**



**Exhibitors:**



**The organizers would like to thank the following companies or institutions for their generous support.**