

# 36<sup>TH</sup> INTERNATIONAL CONFERENCE AND EXPOSITION ON ADVANCED CERAMICS AND COMPOSITES

January 22-27, 2012

Hilton Daytona Beach Resort and Ocean Center

Daytona Beach Florida, USA



Register by  
December 22, 2011  
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Organized by The American Ceramic Society and The American Ceramic Society's Engineering Ceramics Division

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## Award and Plenary Speakers

### 2012 James I. Mueller Award



**David B. Marshall**

Principal Scientist, Teledyne Scientific Company, USA  
Title: Ceramic Composites for High Temperature Aerospace Structures & Propulsion Systems

### Plenary Speakers



**Yoshio Ukyo**

Senior Fellow, Toyota Central R&D Labs., Inc., Japan  
Title: Advanced Battery Materials and Technologies for Next Generation Automobiles: Beyond Li-ion Batteries

### 2012 Bridge Building Award



**Alexander Michaelis**

Director, Fraunhofer Institute for Ceramic Technology & Systems, Germany  
Title: Ceramics for Innovative Energy and Storage Systems



**Jose A. Varela**

Professor, Chemistry Institute, Univ. of São Paulo State, Brazil  
Title: Overview of Brazilian Ceramics R&D Activities and Challenges in Design and Processing of Multifunctional Ceramic Materials and Systems



**Sanjay Mathur**

2012 ICACC Program Chair  
University of Cologne  
Chair, Inorganic and Materials Chemistry  
Department of Chemistry  
Cologne, Germany

## Engineering Ceramics Division Leadership

- Trustee: **Mrityunjay Singh**  
Ohio Aerospace Institute, NASA Glenn Research Center, USA
- Chair: **Dileep Singh**  
Argonne National Lab, USA
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- Vice Chair/Treasurer: **Sujanto Widjaja**  
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- Secretary: **Michael Halbig**  
NASA Glenn Research Center, USA
- Chair 2010-11: **Tatsuki Ohji**  
National Institute of Advanced Industrial Science and Technology (AIST), Japan

## Schedule of Events

### Sunday – January 22

Welcome Reception 5 p.m. – 7 p.m.

### Monday – January 23

Opening Awards Ceremony and Plenary Session 8:30 a.m. – Noon  
Concurrent Technical Sessions 1:30 p.m. – 6 p.m.

### Tuesday – January 24

Concurrent Technical Sessions 8 a.m. – 5:20 p.m.  
Exposition and Reception 5 p.m. – 8 p.m.  
Poster Session A 5 p.m. – 8 p.m.

### Wednesday – January 25

Concurrent Technical Sessions 8 a.m. – 5 p.m.  
Exposition and Reception 5 p.m. – 7:30 p.m.  
Poster Session B 5 p.m. – 7:30 p.m.

### Thursday – January 26

Concurrent Technical Sessions 8 a.m. – 6 p.m.

### Friday – January 27

Concurrent Technical Sessions 8 a.m. – Noon

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## Concurrent Technical Sessions

	Mon PM	Tue AM	Tue PM	Wed AM	Wed PM	Thu AM	Thu PM	Fri AM
<b>Symposium 1: Mechanical Behavior &amp; Performance of Ceramics &amp; Composites</b>	•	•	•	•	•	•	•	•
<b>Symposium 2: Advanced Ceramic Coatings for Structural, Environmental, &amp; Functional Applications</b>				•	•	•	•	•
<b>Symposium 3: 9<sup>th</sup> International Symposium on Solid Oxide Fuel Cells (SOFC): Materials, Science &amp; Technology</b>					•	•	•	•
<b>Symposium 4: Armor Ceramics</b>	•	•	•	•	•			
<b>Symposium 5: Next Generation Bioceramics and Biocomposites</b>					•	•	•	•
<b>Symposium 6: International Symposium on Ceramics for Electric Energy Generation, Storage, and Distribution – COMBINED WITH SYMPOISUM 14</b>	•	•	•	•				
<b>Symposium 7: 6<sup>th</sup> International Symposium on Nanostructured Materials &amp; Nanocomposites</b>	•	•	•	•	•	•	•	
<b>Symposium 8: 6<sup>th</sup> International Symposium on Advanced Processing &amp; Manufacturing Technologies for Structural &amp; Multifunctional Materials &amp; Systems (APMT) in honor of Professor R. Judd Diefendorf</b>	•	•	•	•	•	•		
<b>Symposium 9: Porous Ceramics: Novel Developments &amp; Applications</b>	•	•	•	•				
<b>Symposium 10: Thermal Management Materials and Technologies</b>							•	
<b>Symposium 11: Nanomaterials for Sensing Applications: From Fundamentals to Device Integration</b>						•	•	
<b>Symposium 12: Materials for Extreme Environments: Ultrahigh Temperature Ceramics (UHTCs) and Nano-laminated Ternary Carbides and Nitrides (MAX Phases)</b>				•	•	•	•	•
<b>Symposium 13: Advanced Ceramics and Composites for Nuclear Applications</b>						•	•	•
<b>Symposium 14: Advanced Materials and Technologies for Rechargeable Batteries</b>	•	•	•	•				
<b>Focused Session 1: Geopolymers, Inorganic Polymers, Hybrid Organic-Inorganic Polymer Materials</b>							•	•
<b>Focused Session 2: Computational Design, Modeling, and Simulation of Ceramics and Composites</b>	•	•	•					
<b>Focused Session 3: Next Generation Technologies for Innovative Surface Coatings</b>	•	•	•	•				
<b>Focused Session 4: Advanced (Ceramic) Materials and Processing for Photonics and Energy</b>		•	•	•	•			
<b>European Union – USA Engineering Ceramics Summit</b>	•	•	•					
<b>Global Young Investigator Forum on Advanced Ceramic Technologies</b>					•	•	•	•

# 36<sup>TH</sup> INTERNATIONAL CONFERENCE AND EXPOSITION ON ADVANCED CERAMICS AND COMPOSITES

## Symposium description and organizers

### S1: Mechanical Behavior & Performance of Ceramics & Composites

Long-term mechanical reliability of structural ceramics and composites is a key issue in their ultimate use for a specific application. Correlations between processing and service conditions/environment to failure of ceramics by fracture, fatigue or deformation are key aspects.

**Organizers:** Dileep Singh, Argonne National Lab, USA; Jonathan A. Salem, NASA Glenn Research Center, USA; Jon Almer, Argonne National Lab, USA; Shaoming Dong, Shanghai Institute of Ceramics, China; Monica Ferraris, Politecnico di Torino, Italy; Y. Zhou, Harbin Institute of Technology, China; Michael Halbig, NASA Glenn Research Center, USA; Greg Hilmas, Missouri Science & Technology Institute, USA; Juergen Heinrich, Clausthal Univ. of Technology, Germany; Keyu Li, Oakland Univ., USA; Andrew Wereszczak, Oak Ridge National Lab, USA; J. G. Sun, Argonne National Lab, USA

### S2: Advanced Ceramic Coatings for Structural, Environmental and Functional Applications

Sessions are dedicated to advanced ceramic coating and component developments for aerospace, automotive, and energy applications. Integrated structural, environmental properties and functionality through advanced coating processing and structural design are particularly emphasized.

**Organizers:** Dongming Zhu, NASA Glenn Research Center, USA; H.T. Lin, Oak Ridge National Lab, USA; Uwe Schulz, German Aerospace Center, Germany; Yutaka Kagawa, Univ. of Tokyo, Japan; Rishi Raj, Univ. of Colorado at Boulder, USA; David Marshall, Teledyne Scientific and Imaging Company, USA; Douglas E. Wolfe, Pennsylvania State Univ., USA; Irene T. Spitsberg, Kennametal Inc., USA; Layo Ajayi, Argonne National Lab, USA; Yong-Ho Sohn, Univ. of Central Florida, USA; Robert Vaßen, Forschungszentrum Jülich GmbH, Germany; Rodney W. Trice, Purdue Univ., USA; Ping Xiao, Univ. of Manchester, UK; Jow-Lay Huang, National Cheng Kung Univ., Taiwan; Kyoung Il Moon, Korea Institute of Industrial Technology, Korea

### S3: 9<sup>th</sup> International Symposium on Solid Oxide Fuel Cells (SOFC): Materials, Science & Technology

Participants will present state-of-the-art knowledge of SOFC component materials, processing, cell/stack fabrication and design, electrochemical performance and performance stability, bulk, interface and surface interactions, microstructural and interface engineering, computational simulation and modeling, test procedures and performance analysis, gaseous and liquid fuel processing, etc.

**Organizers:** Prabhakar Singh, Center for Clean Energy Engineering, Univ. of Connecticut, USA; Narottam P. Bansal, NASA Glenn Research Center, USA; J. S. Chung, POSTECH, Korea; Tatsumi Ishihara, Kyushu Univ., Japan; Mihails Kusnezoff, Fraunhofer IKTS, Germany; Nguyen Q. Minh, Consultant, USA; Mogens Mogensen, Risoe National Lab, Denmark; J. O'Brien, INL, USA; Jeffrey W. Stevenson, Pacific Northwest National Lab, USA; A. K. Suri, BARC, India; Toshio Suzuki, AIST, Japan; Eric D. Wachsman, Univ. of Maryland, USA

### S4: Armor Ceramics

Ceramic materials are, and will continue to be, an integral component of the armor systems developed to provide protection for air and ground vehicles as well as the individual soldier. This symposium will bring together researchers to address leading areas, including, opaque

materials, transparent materials, dynamic behavior, impact, penetration, and material modeling.

**Organizers:** Jeffrey J. Swab, U.S. Army Research Lab, USA; James Campbell, U.S. Army Research Lab, USA; Lisa Prokurat Franks, U.S. Army TARDEC, USA; Todd Jessen, U.S. Army Research Lab, USA; Jerry LaSalvia, U.S. Army Research Lab, USA; Brian Leavy, U.S. Army Research Lab, USA; James McCauley, U.S. Army Research Lab, USA; David Stepp, U.S. Army Research Office, USA; Andrew Wereszczak, Oak Ridge National Lab, USA

### S5: Next Generation Bioceramics and Biocomposites

Novel bioceramic materials are being developed to provide improvements in diagnosis and treatment of medical and dental conditions. This symposium will allow for discussion among the many groups involved in the development and use of bioceramics and biocomposites, including ceramic researchers, medical device manufacturers, and clinicians.

**Organizers:** Roger J. Narayan, Univ. of North Carolina, USA; Chikara Ohtsuki, Nagoya Univ., Japan; Markus Reiterer, Medtronic, Inc., USA; Bikramjit Basu, Indian Institute of Technology, India; Akiyoshi Osaka, Okayama Univ., Japan

### S6: International Symposium on Ceramics for Electric Energy Generation, Storage, and Distribution – COMBINED WITH SYMPOSIUM 14

**Organizers:** H. T. Lin, Oak Ridge National Lab, USA; Terry Tritt, Clemson Univ., USA; Tohru Sekino, Tohoku Univ., Japan; Kuan-Zong Fung, National Cheng Kung Univ., Taiwan

### S7: 6<sup>th</sup> International Symposium on Nanostructured Materials and Nanocomposites

This symposium focuses on science and engineering of nanostructured materials, with a strong focus on the elaboration of the practical side of nanotechnology. Special emphasis will be given to novel synthesis, functionalization, processing, and characterization of nanoparticles, nanowires and their heterostructures.

**Organizers:** Sanjay Mathur, Univ. of Cologne, Germany; Suprakas Sinha Ray, DST/CSIR- National Centre for Nanomaterials, South Africa; Yoon-Bong (Y.B.) Hahn, Chonbuk National Univ., Korea; Yasuhiro Tachibana, Osaka Univ., Japan; Alberto Vomiero; Yoshitake Masuda



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One to Four Occupants	\$149
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U.S. Government Employees:	\$82

Mention The American Ceramic Society to obtain the special rate. **Room rates are effective until December 20, 2011 and are based on availability.**

Register by December 22nd to save \$150.  
[www.ceramics.org/daytona2012](http://www.ceramics.org/daytona2012)

### **S8: 6th International Symposium on Advanced Processing & Manufacturing Technologies for Structural & Multifunctional Materials & Systems (APMT) in honor of Professor R. Judd Diefendorf**

The aim of this international symposium is to discuss global advances in the research and development of advanced processing and manufacturing technologies for a wide variety of fiber reinforced and particulate composites, non-oxide and oxide based structural ceramics, and multifunctional materials, as well as their components and devices. Current advances and state-of-the-art in various eco-friendly processing approaches will be covered. Advances in various processing and manufacturing technologies for fine scale MLCCs and transparent or electronic ceramic devices will also be presented.

**Organizers:** Tatsuki Ohji, AIST, Japan; Mrityunjay Singh, Ohio Aerospace Institute, NASA Glenn Research Center, USA; Walter Krenkel, Univ. of Bayreuth, Germany; Soshu Kirihara, Osaka Univ., Japan; Tomaz Kosmac, Josef Stefan Institute, Slovenia; Hejun Li, Northwestern Polytechnical Univ., P. R. China; Kun-Lin Lin, National Nano Device Labs (NDL), Taiwan; Eugene Medvedovski, Umicore Indium Products, USA; Robert J. Shinavski, Hyper-Therm High-Temperature Composites, USA; Richard D. Sisson, Jr., Worcester Polytechnic Institute, USA; Roland Weiss, Schunk Kohenstofftechnik GmbH, Germany

### **S9: Porous Ceramics: Novel Developments & Applications**

This symposium covers the fundamental and novel aspects of processing, synthesis, characterization, modeling, properties evaluation and applications of wide range of porous ceramics. A specific session is devoted to Porous Bioceramics, and will be co-organized in conjunction with Symposium 5.

**Organizers:** Paolo Colombo, Univ. of Padova, Italy; Sujanto Widjaja, Corning Incorporated, USA; Yuji Iwamoto, Nagoya Institute of Technology, Japan; Aldo Boccaccini, Univ. of Erlangen-Nuremberg, Germany; Thomas R. Watkins, Oak Ridge National Lab, USA

### **S10: Thermal Management Materials and Technologies**

The aim of this symposium is to discuss and highlight new materials and the associated technologies related to thermal management.

**Organizers:** Andrew L. Gyekenyesi, Ohio Aerospace Institute, NASA Glenn Research Center, USA; Mrityunjay Singh, Ohio Aerospace Institute, NASA Glenn Research Center, USA; Dileep Singh, Argonne National Lab, USA; Michiko Kusunoki, Nagoya Univ., Japan; Rajiv Asthana, Univ. of Wisconsin-Stout, USA; Ajit K. Roy, Air Force Research Lab, WPAFB, USA; Walter Krenkel, Univ. of Bayreuth, Germany; Tatsuki Ohji, AIST, Japan

### **S11: Nanomaterials for Sensing Applications: From Fundamentals to Device Integration**

This symposium focuses on science and technology of nanostructured materials with interesting and promising properties for sensing applications. Beside approaches towards novel synthesis, processing and modeling of their structure-property correlations at the nanometer length scales, their practical application in different sensing technologies make up the major thrust areas.

**Organizers:** Francisco Hernandez-Ramirez, Catalonia Institute for Energy Research and Univ. of Barcelona Barcelona, Spain; Jia Grace Lu, Univ. of Southern California, USA; Alexander Gaskov, Moscow State Univ., Russia; Gerhard Müller, EADS Deutschland GmbH – Innovation Works, Munich, Germany; Ignasi Vilajosana, Worldsensing, Spain

### **S12: Materials for Extreme Environments: Ultrahigh Temperature Ceramics (UHTCs) and Nanolaminated Ternary Carbides and Nitrides (MAX Phases)**

This symposium covers design, processing, structure-property relationships, thermal and mechanical properties, oxidation resistance, machining and joining, and stability of UHTCs and MAX phases both from fundamental and application-oriented perspectives.

**Organizers:** Yanchun Zhou, Institute of Metal Research Chinese Academy of Sciences, China; Erica L. Corral, Univ. of Arizona, USA; Joyce Deaver, NASA Glenn Research Center, USA; Per Eklund, Linköping Univ., Sweden; William G. Fahrenholtz, Missouri Univ. of Science and Technology, USA; Frederic Monteverde, Institute of Science and Technology of Ceramics-CNR, Italy; Miladin Radovic, Texas A&M Univ., USA; Jochen Schneider, Materials Chemistry, RWTH Aachen, Germany; Luc J. Vandeperre, Imperial College London, UK; Guo-Jun Zhang, Shanghai Institute of Ceramics, Chinese Academy of Sciences, China

### **S13: Advanced Ceramics and Composites for Nuclear Applications**

This symposium provides a venue to discuss the opportunities and needs in such energy systems, and the current state of the art for science and technology of these materials ranging from materials design, processing, and properties to qualification and licensing. This symposium is co-sponsored by the ACerS Nuclear and Environmental Technology Division.

**Organizers:** Kevin M. Fox, Savannah River National Lab, USA; Yutai Katoh, Oak Ridge National Lab, USA; Josef Matyas, Pacific Northwest National Lab, USA; S.K. Sundaram, Alfred Univ., USA

### **S14: Advanced Materials and Technologies for Rechargeable Batteries**

Improvements in materials design, electrodes architecture, and cell chemistry are required to extend the life, enhance the safety, and lower the cost of rechargeable lithium batteries. The search for advanced high capacity electrode materials and the implementation of the very challenging lithium-air batteries will be necessary to overcome the energy density shortfall in current lithium batteries. One session focuses on electric energy generation, storage and distribution.

**Organizers:** Ilias Belharouak, Argonne National Lab, USA; Mickael Badding, Corning, Inc, USA; Marca Doeff, Lawrence Berkeley National Lab, USA; Dominique Guyomard, Institut des Matériaux Jean Rouxel, France; Shirley Meng, Univ. of California San Diego, USA; Jai Prakash, Illinois Institute of Technology, USA; Dileep Singh, Argonne National Lab, USA; Yang-Kook Sun, Hanyang Univ., Republic of Korea

#### **SHORT COURSE: THURSDAY – FRIDAY, JANUARY 26-27**

#### **Mechanical Properties of Ceramics and Glasses**

**Instructors:** George D. Quinn, NIST and  
Richard C. Bradt, University of Alabama

Sign up before December 26, 2011 to save \$125 on short course registration. Participants will learn the fundamentals for elastic properties, strength measurements, fracture parameters and indentation hardness, and be exposed to how the structure of ceramics and glasses determines those properties. Learn more at [www.ceramics.org/daytona2011](http://www.ceramics.org/daytona2011).

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## FS1: Geopolymers, Inorganic Polymers, Hybrid Organic-Inorganic Polymer Materials

Geopolymers are a class of totally inorganic, alumino-silicate based ceramics that are charge balanced by group I oxides. They are rigid gels, which are made under relatively ambient conditions of temperature and pressure into near-net dimension bodies, and which can subsequently be converted to crystalline or glass-ceramic materials.

**Organizers:** Waltraud M. Kriven, Univ. of Illinois at Urbana, USA; Kenneth J.D. MacKenzie, Victoria Univ. of Wellington, New Zealand

## FS2: Computational Design, Modeling, and Simulation of Ceramics and Composites

This symposium focuses on the design, modeling, simulation, and characterization of ceramics and composites so as to further optimize their behavior and facilitate the design of new ceramics or composites with tailored properties.

**Organizers:** Jingyang Wang, Institute of Metal Research, Chinese Academy of Sciences, China; Brian Good, NASA Glenn Research Center, USA; Jan Hamaekers, Fraunhofer Institute for Algorithms and Scientific Computing SCAI, Germany; Michael J. Hoffmann, University of Karlsruhe, Germany; Jian Luo, Clemson University, USA; Katsuyuki Matsunaga, Kyoto University, Japan; Paul Rulis, University of Missouri-Kansas City, USA; Hans J. Seifert, Technical University of Freiberg, Germany; Yanchun Zhou, Institute of Metal Research, Chinese Academy of Sciences, China

## FS3: Next Generation Technologies for Innovative Surface Coatings

This symposium focuses on the technology developments answering the industrial demands, the examples of successful industrialization, the new applications with newly developed technologies, and the future trends of the nanocomposite coatings with multi-functionalities.

**Organizers:** Taejin Hwang, Korea Institute of Industrial Technology, Korea; Kyoung Il Moon, Korea Institute of Industrial Technology, Korea; Kostya Ostrikov, CSIRO Materials Science and Engineering, Australia; Alan W. Weimer, Univ. of Colorado, USA; Dileep Singh, Argonne National Lab, USA; Peter Oliveira, Leibniz-Institute for New Materials, Germany; Sang Sub Kim, Inha Univ., Korea; Se Hoon Kwon, Pusan National Univ., Korea; Seong-Gi Kim, LG Innotek, Korea; Tadachika Nakayama, Nagaoka Univ. of Technology, Japan; Jun Akedo, AIST, Japan; Tim Hosenfeldt, Schaeffler Group, Germany

## FS4: Advanced (Ceramic) Materials and Processing for Photonics and Energy

This symposium covers the synthesis, structural and functional characterisation of self-organized materials and nanostructures of all ceramic materials with application potentials as functional materials, with particular consideration given to the capability to tailor and control material properties via surface and structural modifications.

**Organizers:** Gunnar Westin, Uppsala University, Ångström Lab, Sweden; Federico Rosei, INRS-EMT, Univ. du Quebec, Canada; Alberto Vomiero, CNR – University of Brescia

### EXHIBITION INFORMATION

Reserve your booth space today by contacting Patricia Janeway at [pjaneway@ceramics.org](mailto:pjaneway@ceramics.org) or at 614-794-5826.

Exhibitor	Booth #	Exhibitor	Booth #
AACCM	305	MTI	214
Alfred University	323	Nabertherm	307
AVS, Inc.	210	Netzsch Instruments	
Bricesco	107	N.A. LLC	201
Buhler Inc.	301	Netzsch Premier	
Carbolite, Inc.	206	Technologies, LLC	203
Centorr Vacuum		New Lenox Machine Co.	306
Industries	416	NIST	111
CERAMITEC 2012	117	NIST	113
CM Furnaces, Inc.	311	Oxy-Gon Industries, Inc.	320
Croda	222	Powder Processing &	
Dorst America	220	Technology	412
Dunhua Zhengxing		PremaTech Advanced	
Abrasives Co., Ltd.	205	Ceramics	410
Eirich Machines, Inc.	202	PSC, Inc (Litzler)	223
ENrG Incorporated	300	Quantachrome	
ESL ElectroScience	212	Instruments	313
Evans Analytical Group	315	R.D. Webb Co.	216
Gasbarre Products/ PTX-Pentronix	302	Riedhammer GmbH/ TEAM by Sacmi	321
H.C. Starck	317	Robocasting Enterprises	304
Haiku Tech, Inc.	400	Sonoscan, Inc.	221
Harrop Industries, Inc.	200	Swindell Dressler	
Heraeus Material		International	406
Technology	204	TevTech	207
Keith Company	322	Thermal Wave Imaging	420
MEL Chemicals	121	Wiley	101
Microtrac	303		

### EUROPEAN UNION – USA ENGINEERING CERAMICS SUMMIT

This transatlantic EU-USA Ceramics Summit on “Innovative engineering for functional and value-added materials – towards green and sustainable solutions” brings together a wide class of experts from academia, industries and research institutes/laboratories to discuss the current state of the art and existing technical challenges in research, development, engineering, manufacturing, and application of ceramic and novel functional materials.

**Organizers:** S. Mathur, Univ. of Cologne, Germany; M. Singh, NASA Glenn Research Center, USA; Alex Michaelis, Fraunhofer Institute for Ceramic Technologies and Systems; Juan Ramon Morante, IREC, Spain; Pavol Sajgalik, Slovak Academy of Sciences, Slovakia; Giorgio Sberveglieri, Univ. of Brescia, Italy; George Kiriakidis, FORTH, Greece; Danilo Suvarov, Institut “Jožef Stefan,” Slovenia; Jacques Lamon, Univ. of Bordeaux, France

### GLOBAL YOUNG INVESTIGATORS FORUM

The first Global Young Investigators Forum is meant to facilitate scientific discussions among young researchers and the exchange of ideas essential to identify emerging global challenges at the interface of physics, chemistry, biology, medicine, material research and engineering. This forum will help to establish global cooperations and networks among young scientists to approach future challenges in ceramic science and technology.

**Organizers:** Thomas Fischer, Institute of Inorganic Chemistry, Univ. of Cologne, Germany; K.R.G. Karthik, NTU, Singapore; Sanyucta Kumari, Banaras Hindu Univ., India; Artem Marikutsa, Moscow State Univ., Russia; Andrea Ponzoni, Univ. of Brescia, Italy; J. Daniel Prades, Univ. of Barcelona, Spain; Sven Rank, Institute of Physical Chemistry, Univ. of Tübingen, Germany; Diptiranjian Sahu, University of Witwatersrand, South Africa; Kai Zhang, Institute of Physical Chemistry, Univ. of Cologne, Germany; Elena Timofeeva, Argonne National Lab, USA; Joaquin Ramirez Rico; Univ. of Seville, Spain; Satoko Tasaki; Joining and Welding Research Institute Osaka Univ., Japan



**4 ways to register**

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**Registration**

ICACC'12 Registration	EARLY REG. THROUGH DEC. 22	AFTER DEC. 22
Member*†	<input type="checkbox"/> \$525	<input type="checkbox"/> \$675
Member with 12 month membership renewal*†	<input type="checkbox"/> \$645	<input type="checkbox"/> \$795
Nonmember*† (includes one year of ACerS membership)	<input type="checkbox"/> \$645	<input type="checkbox"/> \$795
Emeritus/Senior Member*†	<input type="checkbox"/> \$395	<input type="checkbox"/> \$545
One Day: Member†	<input type="checkbox"/> \$395	<input type="checkbox"/> \$545
One Day: Nonmember† (includes one year of ACerS membership)	<input type="checkbox"/> \$515	<input type="checkbox"/> \$665
Material Advantage Student Member†	<input type="checkbox"/> \$130	<input type="checkbox"/> \$205
Student: Not in Material Advantage	<input type="checkbox"/> \$165	<input type="checkbox"/> \$240
Exhibit Only	<input type="checkbox"/> \$60	<input type="checkbox"/> \$60
Companion Registration	<input type="checkbox"/> \$60	<input type="checkbox"/> \$60

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 \*Includes Conference Proceedings on CD.  
 † Select free division affiliation (if you don't already have one)

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EMA 2012 & ICACC'12 Combined Rate	EARLY REG. THROUGH DEC. 19	AFTER DEC. 19
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Nonmember†	<input type="checkbox"/> \$870	<input type="checkbox"/> \$1,020
Emeritus/Senior Member†	<input type="checkbox"/> \$565	<input type="checkbox"/> \$715
Material Advantage Student Member†	<input type="checkbox"/> \$190	<input type="checkbox"/> \$265
Student: Not in Material Advantage	<input type="checkbox"/> \$225	<input type="checkbox"/> \$300

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**Cancellation Policy:** Full refund less \$50 if cancelled on or before December 22, 2011; 50% refund if cancelled between December 23, 2011 and January 21, 2012; no refunds after the start of the conference.

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