Advances in Bioceramics and Porous Ceramics V

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This issue contains the proceedings of the “Next Generation Bioceramics” and “Porous Ceramics: Novel Developments and Applications” symposia of the 36th International Conference and Exposition on Advanced Ceramics and Composites (ICACC), which was held on January 22-27, 2012 in Daytona Beach, Florida, USA.

A rapidly developing area of ceramic science & technology involves research into ceramic materials that enhance the treatment of dental and medical conditions. Bioinspired and biomimetic ceramics, which imitate features of materials found in nature, have also stimulated significant interest in the ceramics community. The “Next Generation Bioceramics” symposium addressed several areas related to processing, characterization, modelling, and use of bioceramic materials, including biomineralization; advanced processing of bioceramic materials; bioinspired and biomimetic ceramic materials; self-assembled bioceramic materials; inorganic-organic composite materials; nanoscale bioceramic materials; in vitro and in vivo evaluation of bioceramic materials; mechanical properties of bioceramic materials; bioceramic materials for drug delivery; bioceramic materials for gene delivery; bioceramic materials for sensing; and bioceramic materials for dental applications. This symposium promoted lively discussions among various groups in the bioceramics community, including academic researchers, governmental researchers, and industrial researchers.

The “Porous Ceramics” symposium brought together engineers and scientists working in the area of highly porous ceramic materials, which contain a volume fraction of porosity typically higher than 70%, with pore size ranging from the nano- to the milli-meter scale. The presence of porosity is a key characteristic of these components, enabling their use in widely different and strategic areas such as environment, energy, defense, biomedicine, aeronautics, etc. The topics covered in the 3 days symposium ranged from innovations in processing methods and synthe-
sis, structure and properties, modeling and novel characterization tools, mechanical behavior, micro- and meso-porous ceramics and ceramic membranes.

The quality of the oral and poster presentations and the good attendance were a testimony to the large interest that exists in the community, both academy and industry, for porous ceramics because of their peculiar characteristics and widespread applicability.

We would like to thank the staff at The American Ceramic Society, particularly Greg Geiger, Mark Mecklenborg, Marilyn Stoltz, and Marcia Stout for making this volume possible. We would also like to thank Anita Lekhwani and her colleagues at John Wiley & Sons for their efforts in support of this volume. In addition, we would like to acknowledge the contributors and reviewers, without whom this volume would have not been possible. We also thank the officers of the Engineering Ceramics Division of The American Ceramic Society, including Michael Halbig, Sanjay Mathur, Tatsuki Ohji, Dileep Singh, Mrityunjay Singh, Sujanto Widjaja, and the 2012 Program Chair, Prof. Sanjay Mathur, for their tireless efforts. We hope that this volume becomes a useful resource for academic and industrial efforts involving porous ceramic materials and bioceramic materials. Finally, we anticipate that this volume contributes to advances in ceramic science & technology and signifies the leadership of The American Ceramic Society in these emerging areas.

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Introduction

This issue of the Ceramic Engineering and Science Proceedings (CESP) is one of nine issues that has been published based on content presented during the 36th International Conference on Advanced Ceramics and Composites (ICACC), held January 22–27, 2012 in Daytona Beach, Florida. ICACC is the most prominent international meeting in the area of advanced structural, functional, and nanoscopic ceramics, composites, and other emerging ceramic materials and technologies. This prestigious conference has been organized by The American Ceramic Society’s (ACerS) Engineering Ceramics Division (ECD) since 1977.

The 36th ICACC hosted more than 1,000 attendees from 38 countries and had over 780 presentations. The topics ranged from ceramic nanomaterials to structural reliability of ceramic components which demonstrated the linkage between materials science developments at the atomic level and macro level structural applications. Papers addressed material, model, and component development and investigated the interrelations between the processing, properties, and microstructure of ceramic materials.

The conference was organized into the following symposia and focused sessions:

Symposium 1  Mechanical Behavior and Performance of Ceramics and Composites
Symposium 2  Advanced Ceramic Coatings for Structural, Environmental, and Functional Applications
Symposium 3  9th International Symposium on Solid Oxide Fuel Cells (SOFC): Materials, Science, and Technology
Symposium 4  Armor Ceramics
Symposium 5  Next Generation Bioceramics
Symposium 6  International Symposium on Ceramics for Electric Energy Generation, Storage, and Distribution
Symposium 7  6th International Symposium on Nanostructured Materials and Nanocomposites: Development and Applications
Symposium 8  6th International Symposium on Advanced Processing & Manufacturing Technologies (APMT) for Structural & Multifunctional Materials and Systems
Symposium 9  Porous Ceramics: Novel Developments and Applications
Symposium 10  Thermal Management Materials and Technologies
Symposium 11  Nanomaterials for Sensing Applications: From Fundamentals to Device Integration
Symposium 12  Materials for Extreme Environments: Ultrahigh Temperature Ceramics (UHTCs) and Nanolaminated Ternary Carbides and Nitrides (MAX Phases)
Symposium 13  Advanced Ceramics and Composites for Nuclear Applications
Symposium 14  Advanced Materials and Technologies for Rechargeable Batteries
Focused Session 1  Geopolymers, Inorganic Polymers, Hybrid Organic-Inorganic Polymer Materials
Focused Session 2  Computational Design, Modeling, Simulation and Characterization of Ceramics and Composites
Focused Session 3  Next Generation Technologies for Innovative Surface Coatings
Focused Session 4  Advanced (Ceramic) Materials and Processing for Photonics and Energy
Special Session  European Union – USA Engineering Ceramics Summit
Special Session  Global Young Investigators Forum

The proceedings papers from this conference will appear in nine issues of the 2012 Ceramic Engineering & Science Proceedings (CESP); Volume 33, Issues 2-10, 2012 as listed below.

- Mechanical Properties and Performance of Engineering Ceramics and Composites VII, CESP Volume 33, Issue 2 (includes papers from Symposium 1)
- Advanced Ceramic Coatings and Materials for Extreme Environments II, CESP Volume 33, Issue 3 (includes papers from Symposia 2 and 12 and Focused Session 3)
- Advances in Solid Oxide Fuel Cells VIII, CESP Volume 33, Issue 4 (includes papers from Symposium 3)
- Advances in Ceramic Armor VIII, CESP Volume 33, Issue 5 (includes papers from Symposium 4)
The organization of the Daytona Beach meeting and the publication of these proceedings were possible thanks to the professional staff of ACerS and the tireless dedication of many ECD members. We would especially like to express our sincere thanks to the symposia organizers, session chairs, presenters and conference attendees, for their efforts and enthusiastic participation in the vibrant and cutting-edge conference.

ACerS and the ECD invite you to attend the 37th International Conference on Advanced Ceramics and Composites (http://www.ceramics.org/daytona2013) January 27 to February 1, 2013 in Daytona Beach, Florida.

MICHAEL HALBIG AND SANJAY MATHUR
Volume Editors

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