

The American Ceramic Society's

# ELECTRONIC MATERIALS AND APPLICATIONS 2015

January 21-23 | DoubleTree by Hilton Orlando at Sea World® | Orlando, Florida USA

[ceramics.org/ema2015](http://ceramics.org/ema2015)

*Register by December 23rd to save \$150*

# ELECTRONIC MATERIALS AND APPLICATIONS 2015

The American Ceramic Society's

EMA 2015 addresses key challenges in the field of electronic materials. The 11 symposia cover advances in basic and applied science of electronic, magnetic, dielectric, and optical components and devices; data and energy storage and conversion systems; and sensing, actuation, power systems, and transduction.

## ORGANIZING COMMITTEE



Haugan

**Timothy Haugan**  
Electronics Division  
U.S. Air Force Research Lab  
timothy.haugan@us.af.mil



Dillon

**Shen Dillon**  
Basic Science Division  
University of Illinois at Urbana-  
Champaign  
sdillon@illinois.edu



Brennecka

**Geoff Brennecka**  
Electronics Division  
Colorado School of Mines  
gbrennec@mines.edu

## TUTORIAL ON THIN-FILM STABILITY

This tutorial introduces topics that will be discussed during the Basic Science Division symposium, Thin Films—Stability, Stress Relaxation, and Properties. Designed for researchers and students without extensive background in thin-films, the tutorial covers basic concepts, terminology, and results to maximize the value of the symposium. Discussions will include:

- Thin-film growth, microstructure, and stress
  - Epitaxial and textured films
- Thin-film stress relaxation
  - Dislocation mechanisms in thin-films
  - Diffusion in thin-films
- Thin-film properties
  - Size-dependent plasticity
  - Thermal stresses
  - Fracture of thin-films

### Tutorial Speakers

**Carl Thompson**, Massachusetts Institute of Technology, USA

**Gerhard Dehm**, Max-Planck-Institut für Eisenforschung GmbH, Germany

## 2014 – 2015 OFFICERS

### Basic Science Division

Chair: **Bryan D. Huey**  
Chair-elect: **Shen Dillon**  
Vice chair: **Xingbo Liu**

### Electronics Division

Trustee: **Winnie Wong-Ng**  
Chair: **Timothy Haugan**  
Chair-elect: **Haiyan Wang**  
Vice chair: **Geoff Brennecka**  
Secretary: **Brady Gibbons**  
Secretary-elect: **Rick Ubic**

## HOTEL INFORMATION

### DoubleTree by Hilton Orlando at Sea World®

10100 International Drive  
Orlando, FL 32821

407-352-1100 / 800-327-0363

Rate: \$149

Cutoff: December 23, 2014



## TECHNICAL SESSIONS

Wednesday  
10 a.m. – 12:30 p.m.

S1: Advanced Electronic Materials: Processing, Structures, Properties and Applications		
S2: Ceramic Composites, Coatings, and Fibers		
S3: Computational Design of Electronic Materials		
S4: Functional Thin Films: Processing and Integration Science		
S5: Ion Conducting Ceramics		
S6: LEDs and Photovoltaics — Beyond the Light: Common Challenges and Opportunities		
S7: Multiferroic Materials and Multilayer Ferroic Heterostructures: Properties and Applications		
S8: Recent Developments in High-Temperature Superconductivity		
S9: Structure of Emerging Perovskite Oxides: Bridging Length Scales and Unifying Experiment and Theory		
S10: Thermoelectrics: From Nanoscale Fundamental Science to Devices		
S11: Thin Films and Interfaces: Stability, Stress Relaxation, and Properties		

## INVITED SPEAKERS

**S. Pamir Alpay**, Univ. of Connecticut, *Electrothermal properties of ferroelectric multilayers*

**Amalia Ballarino**, CERN, *HTS for use in accelerator facilities*

**Wei Bao**, Renmin Univ. of China, *High-pressure single-crystal neutron scattering study of the 245 superconductor*

**Richard Beanland**, Univ. of Warwick, *Measuring symmetry, structure and bonding in functional ceramics using 'digital' electron diffraction*

**Scott Beckman**, Iowa State Univ., *Special quasirandom structures of  $K_{0.5}Na_{0.5}NbO_3$*

**Nicole Benedek**, The Univ. of Texas at Austin, *In search of simple design principles for the transport properties of complex oxides*

**Jerry Bernholc**, NC State Univ., *Electronic structure and electron transport in carbon-based nanosystems*

**Saad Binomran**, King Saud Univ., *First-principles-based investigation of physical properties of BST nanodot*

**Volker Blum**, Duke Univ., *First-principles, all-electron approach to electronic interfaces: Challenges and opportunities*

**Sören Boyn**, Unité Mixte de Physique CNRS/Thales, *Ferroelectric memristors for neuromorphic computing*

**Sergey Bud'ko**, Ames Lab/Iowa State Univ., *Combined effects of transition metal (Co, Ni, Rh) substitution, annealing/quenching and hydrostatic pressure on superconductivity and phase diagrams of  $CaFe_2As_2$*

**David Cann**, Oregon State Univ.,  *$BaTiO_3 - Bi(Zn_{0.5}Ti_{0.5})O_3$  relaxors for high temperature and high energy capacitor applications*

**Eric Chason**, Brown Univ., *A kinetic picture for understanding residual stress in thin films: real-time experiments and modeling*

**Dominique Chatain**, CNRS - Aix-Marseille Univ., *A new mechanism of hetero-epitaxy and orientation relationships*

**Xiaolong Chen**, Chinese Academy of Sciences, *Structural evolution in  $K_xFe_{2-y}Se_2$ : Unstable phase, superconducting phases, and vacancy phases*

**Paul C. W. Chu**, Univ. of Houston, *The meissner and mesoscopic superconducting states in the ultrathin FeSe-films*

**Kazimierz Conder**, Paul Scherrer Inst., *Superconductivity in alkali metal intercalated iron chalcogenides*

**Alastair Cormack**, Alfred Univ., *Correlated sodium transport in  $\beta$ -alumina*

**Shane Cybart**, UC San Diego, *Josephson and quasi-particle tunneling in high-transition-temperature superconductor Josephson junctions from ion beam irradiation*

**John Daniels**, UNSW Australia, *Experimental observations of grain-scale interactions in electroceramics: The difficult length scale*

**Gerhard Dehm**, Max Planck Institut für Eisenforschung, *Probing deformation mechanisms of metallic structures relevant for electronic applications*

**Alex Demkov**, Univ. of Texas, Austin, *Designing integrated ferroelectric devices*

**Satoshi Demura**, Tokyo Univ. of Science, *Superconductivity and the magnetism in  $BiS_2$ -based superconductors*

**Claudia Draxl**, Humboldt-Universität zu Berlin, *From molecules to their condensed phases: Challenges, concepts, and control of their properties*

**Roman Engel-Herbert**, The Pennsylvania State Univ., *Epitaxial integration of functional perovskite oxides on Si*

**Daniel Feezell**, Univ. of New Mexico, *Light-emitting diodes based on ordered arrays of III-nitride core-shell nanostructures*

**Peter Finkel**, NRL, *Giant magnetoelectric effect in nonlinear multiferroic heterostructure*

**Michael Foster**, Sandia National Labs, *Computational design of near-IR absorbing organic materials for light harvesting applications*

**Julia Glaum**, UNSW Australia, *Relaxor-ferroelectric transition in BNT-based piezoceramics*

**Giovanni Grasso**, Columbus Superconductors SpA, *Progress in industrial manufacturing of ex-situ  $MgB_2$  superconducting wires*

**Benjamin Griffin**, Sandia National Labs, *Piezoelectric MEMS based on aluminum nitride*

**Alexei Gruverman**, Univ. of Nebraska-Lincoln, *Electromechanical coupling and interface control of resistive switching in ferroelectric heterostructures*

**Hongsoo Ha**, Korea Electrotechnology Research Inst., *Recent progress of ReBCO coated conductor made by RCE-DR process*

**Hanns-Ulrich Habermeier**, MPI-FKF, *Thermoelectric properties of PLD grown  $Ca_3Co_4O_9$  thin films*

**Seungbum Hong**, Argonne National Lab, *Enhancement of local piezoresponse in polymer ferroelectrics via nanoscale control of microstructure; Charge gradient microscopy: Electromechanical charge scraping at the nanoscale*

**Bryan Huey**, Univ. of Connecticut, *Ferroelectric domain switching in  $BiFeO_3$  multiferroics*

**Jon Ihlefeld**, Sandia National Labs, *Room temperature voltage tuning of thermal conductivity in ferroelectric thin films*

**Akira Iyo**, AIST, *Recent discovery of new superconductors containing pnictogen atoms*

**Bharat Jalan**, Univ. of Minnesota, *MBE growth, heterostructure engineering and electronic transport properties of complex oxides via stoichiometry control*

**Dirk Johrendt**, Ludwig-Maximilians-Universität München, *Coexistence of 3d-ferromagnetism and superconductivity in  $[(Li_{0.8}Fe_{0.2})OH]FeSe$*

**Jacob L. Jones**, North Carolina State Univ., *Doped  $HfO_2$ : Ferroelectricity and non-equilibrium structures in thin films and bulk ceramics; Insights into the local structure of ferroelectrics via pair distribution function studies*

**Daisuke Kan**, Kyoto Univ., *Phase control of a transition metal oxide through interface engineering of oxygen displacement*

**Maarit Karppinen**, Aalto Univ., *Nanostructuring of oxide thermoelectrics by atomic/molecular layer deposition*

**Dong Jik Kim**, Univ. of Nebraska-Lincoln, *Room-temperature ferroelectricity of epitaxially stabilized hexagonal  $TbMnO_3$  films*

**Suk Jun Kim**, KOREATECH, *Novel application of metallic glass: Ag paste for solar cell*

**Masahiko Kimura**, Murata Manufacturing Co., Ltd., *Study of textured piezoelectric ceramics fabricated by magnetic alignment*

**Emmanouil Kioupakis**, Univ. of Michigan, *Predictive calculations of nitride nanostructures for visible and ultraviolet light emitters*



# ELECTRONIC MATERIALS AND APPLICATIONS 2015

## PLENARY SPEAKERS



Budd

### Kent Budd

Senior staff scientist, Corporate Research Materials Laboratory, 3M, USA

Title: *EMA-related technologies and research at a diverse global manufacturer*



Rohrer

### Greg Rohrer

W.W. Mullins Professor of Materials Science, head, Materials Science and Engineering Department, Carnegie Mellon University, USA

Title: *High throughput, data-rich experiments, and their impact on ceramic science*



Funakubo

### Hiroshi Funakubo

Professor, Tokyo Institute of Technology, Japan

Title: *Domain motion under applied electric field in Pb(Zr,Ti)O<sub>3</sub> films and their contribution to the piezoelectric properties*

## STUDENT AWARDS AND COMPETITION

EMA 2015 strongly supports undergraduate and graduate student participation. The student finalists may present in their original symposium or in a special lunchtime session on Wednesday and Thursday highlighting the work of top students.

## FAILURE—THE GREATEST TEACHER

The vast majority of scientific literature and conference talks report positive results, but there is a lot to be learned from negative results and missteps as well. Take this opportunity to hear recognized leaders in the field discuss failure and perhaps recount some of their most spectacular learning experiences during a frank and friendly discussion in a relaxed atmosphere. Speakers and audience alike are encouraged to check their egos at the door for this event that has turned into an EMA highlight.

## SCHEDULE

### Tuesday – January 20, 2015

Registration 5:00 p.m. – 6:30 p.m.

### Wednesday – January 21, 2015

Registration 7:30 a.m. – 6:00 p.m.  
 Opening comments 8:30 a.m. – 8:45 a.m.  
 Plenary session I 8:45 a.m. – 9:30 a.m.  
 Concurrent technical sessions 10 a.m. – 12:30 p.m.  
 Lunch on own 12:30 – 2:00 p.m.  
 Student award session 12:40 p.m. – 1:50 p.m.  
 Poster session set-up Noon – 5:00 p.m.  
 Concurrent technical sessions 2:00 p.m. – 5:30 p.m.  
 Poster session & reception 5:30 p.m. – 7:30 p.m.  
 Basic Science Division tutorial 7:45 p.m. – 9:45 p.m.

### Thursday – January 22, 2015

Registration 7:30 a.m. – 5:30 p.m.  
 Plenary session II 8:30 a.m. – 9:30 a.m.  
 Concurrent technical sessions 10:00 a.m. – 12:30 p.m.  
 Lunch on own 12:30 p.m. – 2:00 p.m.  
 Student award session 12:40 p.m. – 1:50 p.m.  
 Concurrent technical sessions 2:00 p.m. – 5:30 p.m.  
 Conference dinner 7:00 p.m. – 9:00 p.m.

### Friday – January 23, 2015

Registration 7:30 a.m. – 5:30 p.m.  
 Plenary session III 8:30 a.m. – 9:30 a.m.  
 Concurrent technical sessions 10:00 a.m. – 12:30 p.m.  
 Lunch on own 12:30 p.m. – 2:00 p.m.  
 Concurrent technical sessions 2:00 p.m. – 5:30 p.m.  
 Failure—The greatest teacher 5:45 p.m. – 6:45 p.m.

## REGISTRATION RATES

	Early Reg. Through Dec. 23	After Dec. 23
ACerS Member	\$555	\$705
ACerS Member plus 12 month membership renewal	\$685	\$835
Nonmember	\$685	\$835
ACerS Emeritus/Senior/Associate Member	\$445	\$595
One Day Member	\$445	\$595
One Day Nonmember	\$575	\$725
Material Advantage Student Member	\$150	\$225
Nonmember Student	\$200	\$275
Guest	\$75	\$75

Note: All registrations include welcome reception and conference dinner.

Cancellation Policy: Full refund less \$50 if cancelled on or before December 23, 2014; 50% refund if cancelled between December 24, 2014 and January 22, 2015; no refunds after the start of the conference.