

Tuesday, September 18, 2007

Automotive: Automotive and Ground Vehicles: Applications of Materials to Vehicle Designs

Keynote: Materials and Materials Challenges for Automotive Technologies Being Developed

Room: W2-63

Session Chair: John McDonald, General Motors

7:50 AM

Introductory Remarks

7:55 AM

Materials and Materials Challenges for Advanced Automotive Technologies being Developed to Reduce Global Petroleum Consumption (Invited)

D. Gerard*, General Motors, USA

Automotive: Advanced High-Strength and Other Specialty Sheet Steel Products for the Automotive Industry

Processing and Properties of Other Advanced High Strength and Specialty Steels II

Room: W2-65

Session Chair: Issac Garcia, University of Pittsburgh

8:30 AM

Introductory Remarks

8:40 AM

Implications of Hot-Stamped Boron Steel Components in Automotive Structures

R. Mohan-lyengar*, B. Fedewa, Severstal North America, USA

9:00 AM

Critical Review of Hot Stamping Technology for Automotive Steels

D. Fan*, S. Biroasca, H. Kim, B. C. De Cooman, POSTECH, South Korea

9:20 AM

Physical Process Simulation of Hot Forming of Hardenable Galvanized Steel

P. Martin*, O. Dremailova, M. Laronde, B. Voyzelle, CANMET-Materials Technology Laboratory, Canada

9:40 AM

High Strength Air-Hardening Steels for Automotive Applications

U. Diekmann*, Benteler Steel/Tube, Germany; A. Frehn, Benteler Automotive, Germany; T. Säuberlich, Benteler Steel/Tube, Germany

10:00 - 10:20 a.m.

Break

10:20 AM

A Feasibility Study of the Nanostructured Steel Sheet for Automotive Industry

A. Chen, Shanghai Jiao Tong University, China; J. Zhang, H. Song, Baosteel Technology Centre, China; J. Lu*, The Hong Kong Polytechnic University, Hong Kong

10:40 AM

Quantification of Nano-Sized Precipitates in Microalloyed Steels

J. Lu*, H. Henein, D. Ivey, University of Alberta, Canada

11:00 AM

High Cycle Fatigue Behaviour of High Strength Spring Steels AISI 201 and AISI 301 Used in Automotive

M. Berta*, Federal Mogul GMBH, Germany; J. Stout, A. West, T. Zurluh, Federal Mogul GMBH, USA

11:20 AM

Internal Stresses and Dislocation Densities Generated by Phase Transformations in Steel

E. Clarke*, A. Wilkinson, R. Todd, University of Oxford, United Kingdom

Automotive: Automotive and Ground Vehicles: Applications of Materials to Vehicle Designs

Multifunctional Materials I

Room: W2-63

Session Chairs: Y. Murty, Cellular Materials; Phil Dudd, Naval Surface Warfare Center

8:35 AM

Introductory Remarks

8:40 AM

Multifunctional Materials: Current Status and Future Directions (Invited)

H. Wadley*, University of Virginia, USA

9:00 AM

Heterogeneous Core Structures in Multi-Functional Sandwich Panel Design

B. Langhorst*, D. R. Mumm, University of California, Irvine, USA

9:20 AM

Discrete-Pin Placement Approaches to Sandwich Panel Core Structures

D. R. Mumm*, University of California, Irvine, USA

9:40 AM

Concepts for Robust Lattice Materials with Low Thermal Expansion and High Stiffness (Invited)

C. Steeves*, University of California Santa Barbara, USA; S. Lucato, Teledyne Technologies, USA; M. He, University of California Santa Barbara, USA; J. W. Hutchinson, Harvard University, USA; A. G. Evans, University of California Santa Barbara, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Developing Advanced Dampers

Y. Qiao*, V. K. Punyamurtula, UCSD, USA

10:40 AM

Structural Analysis of Core Topologies for Metal Sandwich Structures (Invited)

K. Koppenhoefer*, S. P. Yushanov, J. R. Dydo, J. S. Crompton, Advanced Computational & Engineering Services, USA; S. L. Nambodri, R. K. Elzey, R. Kurtz, Cellular Materials International, Inc, USA

11:00 AM

Crush Behavior of Pumice Reinforced Cores

C. Fleischer*, M. Zupan, UMBC- University of Maryland Baltimore County, USA

Tuesday AM

* Denotes Presenting Author

11:20 AM

Fatigue Behavior of Pin-Reinforced Foam Cores

M. C. Rice*, UMBC- University of Maryland Baltimore County, USA; M. Collette, Science Applications International Corporation, USA; M. Zupan, UMBC- University of Maryland Baltimore County, USA

Automotive: Automotive and Ground Vehicles: Materials and Processes for Vehicles

Elevated Temperature Forming

Room: W2-62

Session Chair: Pete Bauerle, DaimlerChrysler

8:35 AM

Introductory Remarks

8:40 AM

New Perspectives for Hot Stamping of Sheets

B. Casas*, D. Marco, N. Rodriguez, I. Valls, Rovalma, S.A., Spain

9:00 AM

Failure Mechanisms and Formability in Hot Forming of AA5083 Sheet

E. M. Taleff*, The University of Texas at Austin, USA; P. E. Krajewski, General Motors Corp., USA

9:20 AM

Warm Formability of an AZ31B Magnesium Alloy Sheet

K. P. Boyle*, Natural Resources Canada, Canada

9:40 AM

Magnesium Forming Limit Diagram at Elevated Temperature

J. Carsley*, General Motors, USA; E. Hsu, McGill University, Canada; R. Verma, General Motors, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Superplastic Forming of Lightweight Alloys: An Integrated Approach

F. Abu-Farha, M. Nazzal, M. Khraisheh*, University of Kentucky, USA

10:40 AM

Effect of Grain Size and Strain Rate on Deformation and Failure in AA5083 at 450C

P. E. Krajewski*, General Motors R&D, USA

11:00 AM

Effect of Grain Size on Biaxial Bulge Forming at 450C: Comparison of Modeling and Experiment

L. G. Hector*, P. E. Krajewski, General Motors R&D, USA; N. Du, A. F. Bower, Brown University, USA

11:20 AM

Evaluation of Superplastic Deformation Behavior of AZ31 Magnesium Alloys

X. Li*, B. Mansoor, A. Ghosh, University of Michigan, USA; R. Decker, Thixomat Inc., USA

11:40 AM

Modeling of Transformation Superplastic Forming of Ti Alloys

Q. Li*, University of Nevada, Reno, USA

Automotive: Automotive Light Metal Castings: Technology and Applications

Casting Process Development, Simulation and Modeling

Room: W2-64

Session Chairs: Baicheng Liu, Tsinghua University; Christoph Beckermann, University of Iowa

8:30 AM

Introductory Remarks

8:40 AM

Simulation of Porosity and Hot Tears in Magnesium Castings (Invited)

K. D. Carlson, M. Pokorny, C. Beckermann*, University of Iowa, USA

9:20 AM

Microporosity Modelling during Solidification of Aluminum Alloys

G. Backer*, Flow Logic, USA; Q. Wang, General Motors Powertrain, USA

9:40 AM

Pore Nucleation from Pre-Existing Bubbles: A Computational Study

R. Sasikumar*, Regional Research Laboratory (CSIR), India; M. J. Walker, General Motors Corporation, USA; S. Savithri, Regional Research Laboratory (CSIR), India; S. Sunderraj, General Motors Corporation, India

10:00 - 10:20 a.m.

Break

10:20 AM

Computer Simulations of Realistic Three-Dimensional Pores in Pressure Die-Cast Mg-Alloys

S. Lee*, A. Gokhale, Georgia Institute of Technology, USA

10:40 AM

Modeling on Evolution of Microstructure and Microscopic Shrinkage Porosity in Solidification of Magnesium Alloy

L. Huo, Z. Han*, B. Liu, Tsinghua University, China

11:00 AM

Influence of Mold Temperature and Pouring Temperature on Hot Tearing Susceptibility of AZ91 Magnesium Alloy

L. Bichler*, A. Elsayed, K. Lee, C. Ravindran, Ryerson University, Canada

11:20 AM

Mold Filling Simulations for the Semi Solid Metal Manufacturing Process

G. Backer*, Flow Logic, USA

Automotive: High-Density Hydrogen Storage for Automotive Applications: Materials and Methods

Complex Hydrides III

Room: W2-66

Session Chair: Ji-Cheng Zhao, General Electric Co.

8:30 AM

Introductory Remarks

8:40 AM

Improved Hydrogen Release from Catalyzed Li-B-N-H (Invited)

F. E. Pinkerton*, M. S. Meyer, G. P. Meisner, M. P. Balogh, General Motors R&D Center, USA

9:20 AM

Materials for Hydrogen Storage: From Carbon to the Li-B-N-H System (Invited)

G. P. Meisner*, F. E. Pinkerton, M. S. Meyer, M. P. Balogh, General Motors Research & Development Center, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Solid State Hydride Property Predictions from First Principles Calculations (Invited)

L. G. Hector*, General Motors Research and Development Center, USA

11:00 AM

Hydrogen Storage Compositions Based On $x \text{LiNH}_2 - y \text{LiBH}_4 - z \text{MgH}_2$

A. Sudik*, J. Yang, D. Siegel, Ford Motor Company, USA; C. Wolverton, Northwestern University, USA

11:20 AM

Self-catalyzing Reactions – A Strategy for Improving Hydrogen Reaction Kinetics of Multi-component Complex Hydride Storage Materials (Invited)

J. Yang*, A. Sudik, D. Siegel, Ford Motor Company, USA; C. Wolverton, Northwestern University, USA; V. Ozolins, University of California, USA

Electronic and Magnetic Properties: Basic and Applied Needs for Superconductivity

Coated Conductors I

Room: D2-11

Session Chairs: Chakrapani Varanasi, University of Dayton Research Institute; M. Bhuiyan, Oak Ridge National Laboratory

8:30 AM

Introductory Remarks

8:40 AM

Progress in the Development of Tunable, High-Current MOD YBCO Films for Coated Conductors (Invited)

T. G. Holesinger*, B. Maiorov, M. Feldmann, Y. Coulter, L. Civale, Los Alamos National Laboratory, USA; V. Maroni, D. Miller, Argonne National Laboratory, USA; Z. Chen, D. Larbalestier, Florida State University, USA; X. Li, Y. Huang, W. Zhang, M. Rupich, American Superconductor Corporation, USA

9:20 AM

Optimal Vortex Pins at Different Magnetic Fields (Invited)

J. Wu*, R. Emergo, X. Wang, J. Baca, Univ. of Kansas, USA; T. Haugan, P. Barnes, Air Force Research Lab, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Enhancement in Flux-Pinning for NdBa₂Cu₃O_{7-δ} Coated Conductors via Incorporation of BaZrO₃ Nanodots (Invited)

S. Wee*, A. Goyal, S. Cook, Y. Zuev, L. Heatherly, Oak Ridge National Laboratory, USA

11:00 AM

Thin Film Superconducting (YBa₂Cu₃O_{7-x}) Layers Fabricated by Different Processes: Comparison of Recently Developed Nanoparticle Precursor Method with Conventional Approaches (Invited)

S. Mukhopadhyay*, V. Chintamaneni, J. Su, Wright State University, USA

11:40 AM

Simplified YBCO/IBAD MgO Coated Conductor using a Single Buffer Layer

L. Stan*, P. N. Arendt, Los Alamos National Laboratory, USA; H. Wang, Texas A & M University, USA; S. R. Foltyn, T. G. Holesinger, B. Maiorov, L. Civale, I. O. Usov, Q. Jia, R. F. DePaula, J. R. Groves, Los Alamos National Laboratory, USA

Electronic and Magnetic Properties: Ferroelectrics and Multiferroics

Domain Switching, Phase Transition, and Thin Film Phenomenon

Room: D2-10

Session Chairs: Xiaoli Tan, Iowa State University; Shashank Priya, The University of Texas Arlington

8:10 AM

Introductory Remarks

8:20 AM

Thermal Effects on Mechanical Grinding-Induced Surface Texture in Tetragonal Piezoelectrics

W. Chang, A. H. King, K. J. Bowman*, Purdue University, USA

8:40 AM

Phase-field Approach to Domain Structures and Switching in Polycrystalline PZT Thin Films

S. Choudhury*, L. Chen, The Pennsylvania State University, USA

9:00 AM

Ferroelectric and High-Permittivity Thin Films for Tunable Dielectric Applications (Invited)

S. Stemmer*, University of California, USA

9:40 AM

Poling of Hard Tetragonal PZT and the Contribution of Ferroelastic Domains to Polarization

T. S. Key, K. Bowman*, Purdue University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Crystallographic Nanodomain Engineering of Ferroelectric Single Crystals for Large, Reversible, An hysteretic Piezoelectric Strain

Y. U. Wang*, Virginia Tech, USA

10:40 AM

Local Switching and Domain Evolution of PZT Thin Films – A Phase-Field Simulation

S. Choudhury*, J. Zhang, L. Chen, The Pennsylvania State University, USA; S. Kalinin, Oak Ridge National Laboratory, USA

11:00 AM

Integrated Technology of Decoupling BST Thin Film Capacitors (Invited)

N. Kamehara*, FUJITSU QUALITY LABORATORY LTD., Japan; K. Kurihara, FUJITSU LABORATORIES LTD., Japan

11:40 AM

Direct Observation of Domain Textures of a Soft PZT Ceramic in the Region of a Loaded Crack Using an In Situ Synchrotron Beam

S. Imlao*, UNSW, Australia; J. L. Jones, University of Florida, USA; M. Hoffman, UNSW, Australia

Tuesday AM

12:00 PM

Phase-Field Model of Phase Stability in Thin Films with First-Principles Input

B. Winchester*, J. Zhang, L. Chen, Pennsylvania State University, USA

Electronic and Magnetic Properties: General Topics in Electroceramics

Piezoelectric Materials, Motors, and Transducers

Room: D2-15

Session Chair: Dwight Viehland, Virginia Tech

8:30 AM

Introductory Remarks

8:40 AM

Design Considerations of High Power Piezoelectric Transformers

S. O. Ural*, K. Uchino, The Pennsylvania State University, USA

9:00 AM

Piezoelectrically Activated Multi Degree-of-Freedom Smart Surface

S. Tuncdemir*, K. Uchino, The Pennsylvania State University, USA

9:20 AM

Ultrasonic Motors Co-sintered with Low Temperature Cofired Ceramics (LTCC) for Optical Fiber Alignment

S. Park*, Penn State, USA; R. Eitel, University of Kentucky, USA; A. Baker, C. A. Randall, K. Uchino, Penn State, USA

9:40 AM

Anisotropic Loss Mechanisms in Piezoelectric Ceramics

A. M. Rajapurkar*, N. Bhattacharya, S. Park, S. Ural, K. Uchino, Pennsylvania State University, USA

10:00 - 10:20 a.m.

Break

Electroceramic Materials Processing and Characterization

Room: D2-15

Session Chair: Geoff Brenneka, Sandia National Labs

10:20 AM

Sintering and High Temperature Chemistry in Ceramic Processing (Invited)

S. J. Lombardo*, M. Schurwanz, University of Missouri, USA; G. A. Rossetti, University of Connecticut, USA

11:00 AM

Microstructure, Dielectric, and Electrical Properties of $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3\text{-BaTiO}_3$ Ceramics

B. A. Bender*, M. Pan, Naval Research Laboratory, USA

11:20 AM

Non-Lead Based Ceramic Film Processing by Laser Transfer for Improved Integration and System-in-Package

T. Chakraborty*, R. Miles, Institute of Microwaves and Photonics, United Kingdom; S. Milne, Institute for Materials Research, United Kingdom

11:40 AM

Effect of Ca Substitution on the Microwave Dielectric Properties of $\text{Ba}(\text{Mg}_{1/3}\text{Ta}_{2/3})\text{O}_3$

T. Shimada*, Hitachi Metals, Ltd., Japan

Electronic and Magnetic Properties: International Symposium on Dielectric Materials: Design, Preparation and Applications

Mechanism, Modeling and Designing Issues for Piezoelectric Materials

Room: D2-09

Session Chairs: Amar Bhalla, Pennsylvania State University; Yu Wang, Virginia Tech; Ram Katiyar, University of Puerto Rico

8:30 AM

Introductory Remarks

8:40 AM

Revised Method for the Prediction of Lattice Constants in Perovskites (Invited)

R. Ulic*, Boise State University, USA

9:00 AM

Effect of Acceptor (Mg) Concentration on the Electrical Resistance at Room and High (200°C) Temperature of Acceptor-Doped BaTiO_3 Ceramics

S. Yoon*, M. Hong, J. Hong, Y. Kim, K. Hur, Samsung Electro-Mechanics Co. Ltd., South Korea

9:20 AM

Electronic Structure of Charged Intrinsic Defects in Rutile Titanium Oxide

J. He, S. B. Sinnott*, University of Florida, USA

9:40 AM

Dielectric Properties of $\text{MgO-Ba}_0.5\text{Sr}_0.5\text{TiO}_3$ Composite from Numerical Approach

J. H. Wang*, R. Guo, A. Bhalla, The Pennsylvania State University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Temperature- and Stress-Dependent Scaling of Ferroelectric Hysteresis in Soft and Hard PZT Bulk Ceramics (Invited)

R. Yimnirun*, S. Wongsanmai, M. Unruan, N. Wongdamnern, A. Ngamjarurojana, Y. Laosiritaworn, S. Ananta, Chiang Mai University, Thailand

10:40 AM

Fundamental Understanding of the Thermochemistry and Interface Engineering in Ni-BaTiO_3 Multilayer Ceramic Capacitors

A. V. Polotai*, G. Yang, D. P. Shay, E. C. Dickey, C. A. Randall, The Pennsylvania State University, USA

11:00 AM

Interfacial Polarization in Liquid Phase Sintered Ceramic / Glass Composites

E. P. Gorzkowski*, M. Pan, B. Bender, C. Wu, Naval Research Laboratory, USA

11:20 AM

Computer-Aided Design and Processing of Dielectric Composites: Processing-Mechanism-Microstructure-Property Relationships

Y. U. Wang*, Virginia Tech, USA

11:40 AM

Examination of Surface Roughness Influence on Insertion Loss with use of Length-Scale Fractal Analysis at Radio Frequencies within Low Temperature Co-fired Ceramics

T. S. Vincent*, I. Bar-On, C. A. Brown, Worcester polytechnic, USA

Electronic and Magnetic Properties: Structure-Property Relationships of Multifunctional Oxide Thin Films and Interfaces

Effect of Surface and Interface on the Properties of Metal-oxides

Room: D2-08

Session Chairs: Xiaoqing Pan, University of Michigan; Gerd Duscher, North Carolina State University

8:30 AM

Introductory Remarks

8:40 AM

Atomic Origin of Low-Temperature Resistance Anomaly at SrTiO₃ Grain Boundaries (Invited)

G. Duscher*, North Carolina State University, USA; R. Shao, University of Pennsylvania, USA; M. F. Chisholm, Oak Ridge National Laboratory, USA; D. A. Bonnell, University of Pennsylvania, USA

9:20 AM

Observations and Simulations of Resistance Switching Behavior in Oxide Thin Film Heterostructures

S. Choi*, J. Meador, K. Jiang, H. Lee, R. Hussin, J. Bain, S. Marek, P. A. Salvador, Carnegie Mellon University, USA

9:40 AM

Structure and Phase Evolution in a Sol Gel Derived Nanostructured Barium Titanate Thin Film

L. M. Radonjic*, M. D. Todorovic, J. M. Miladinovic, Belgrade University, Yugoslavia

10:00 - 10:20 a.m.

Break

10:20 AM

Probing the Local Chemistry of Coherent and Incoherent Grain Boundaries in Sr(Ba)TiO₃ (Invited)

H. Gu*, Shanghai Institute of Ceramics, Chinese Academy of Sciences, China

11:00 AM

Ferroelectric (BaTiO₃)_n/(SrTiO₃)_m Superlattices for Acoustic Bragg Mirrors (Invited)

X. Xi*, A. Soukiassian, W. Tian, D. A. Tenne, D. G. Schlom, Penn State University, USA; N. D. Lanzillotti-Kimura, A. Bruchhausen, A. Fainstein, CNEA, Argentina; H. Sun, X. Pan, University of Michigan, USA; A. Cros, A. Cantarero, University of Valencia, Spain

11:40 AM

Stability of Nanometer-thick Surficial Amorphous Films in TiO₂-Supported V₂O₅ Catalysts

H. Qian, J. Luo*, Clemson University, USA

Energy: Encapsulation and Immobilization of Hazardous and Nuclear Wastes Using Ceramics, Glass and Other Materials

Encapsulation and Immobilization of Nuclear Waste

Room: D2-12

Session Chair: Elizabeth Hoffman, Savannah River National Laboratory

8:30 AM

Introductory Remarks

8:40 AM

Preliminary Control Strategy for Hanford High-Level Waste Glass Formulation

J. Vienna*, Waste Treatment and Immobilization Plant, USA; D. S. Kim, PNNL, USA

9:00 AM

Suppression of Nepheline Crystallization in High-Level Waste Glass

K. M. Fox*, T. B. Edwards, D. K. Peeler, Savannah River National Laboratory, USA

9:20 AM

Helium Behaviour in R7T7 Nuclear Waste Glass Investigated by NRA Technique

F. Chamseddine*, T. Sauvage, Centre d'Etudes et de Recherches par Irradiation (CERI-CNRS), France; S. Peugeot, Commissariat à l'Énergie Atomique (CEA), Rhône Valley Research Center, France; M. Guillaume, Centre d'Etudes et de Recherches par Irradiation (CERI-CNRS), France

9:40 AM

Glass Formulation Study for Immobilization of Combined Global Nuclear Energy Partnership Wastes

J. V. Crum*, J. Vienna, A. B. Gallegos, C. P. Rodriguez, Pacific Northwest National Laboratory, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Process Changes to DWPF to Increase Throughput and Incorporate Salt Streams

C. C. Herman*, D. K. Peeler, T. B. Edwards, M. E. Stone, M. E. Smith, Savannah River National Laboratory, USA

10:40 AM

Glass Property Models for Accurate Prediction of Hanford High-Level Waste Glass Volumes

J. Vienna*, A. Fluegel, Pacific Northwest National Laboratory, USA; P. Certa, CH2M Hill Hanford Group, USA; D. S. Kim, Pacific Northwest National Laboratory, USA

11:00 AM

Vitrification and Waste-Form Qualification Research for the Hanford Waste Treatment and Immobilization Plant

V. Jain*, J. Vienna, L. L. Petkus, K. H. Abel, Waste Treatment and Immobilization Plant, USA

11:20 AM

Influence of Combined Cations and Anions in Metakaolin-Based Geopolymers: Immobilisation and Setting Behaviour

E. Vance*, P. Walls, J. Hanna, K. Pike, D. Perera, Z. Aly, Australian Nuclear Science and Technology Organisation, Australia

11:40 AM

Overview of Saltstone Operations at the Savannah River Site

A. Cozzi*, SRNL, USA

Energy: Energy Materials

Solar Energy Materials I

Room: D2-13

Session Chairs: Fatih Dogan, University of Missouri Rolla; Masanobu Awano, National Institute of Advanced Industrial Science and Technology

8:30 AM

Introductory Remarks

8:40 AM

TiO₂-Based Nanomaterials for Sustainable Energy Applications (Invited)

Y. Suzuki*, D. D'Elia, C. Baurer, P. Ilbizián, A. Rigacci, J. Hocheppied, J. Gonzalez-Aguilar, N. Traisnel, L. Fulcheri, P. Achard, Ecole des Mines de Paris, France

9:20 AM

Investigation of Electrolyte Charge Transfer in a Dye Sensitized Solar Cell

J. D. Sorge*, J. McCarthy, P. Lee, D. P. Birnie, III, Rutgers University, USA

10:00 - 10:20 a.m.

Break

Fuel Cells

Room: D2-13

Session Chair: Ali Sayir, NASA Glenn Research Center

10:20 AM

High Temperature Protonic Conducting Ceramics (Invited)

F. Dynys*, NASA Glenn, USA; A. Sayir, Case Western Reserve University, USA; M. Berger, Ecole des Mines de Paris – Centre des Matériaux, France; P. Berger, Ecole Laboratoire Pierre SUE (CEA/CNRS), France

11:00 AM

Hydrogen Transport in Ceramic Proton Conductors: a Local Approach using Transmission Electron Microscopy and Nuclear Microprobe (Invited)

M. Berger*, MinesParis ParisTech, France; P. Berger, CEA CNRS, France; F. Dynys, NASA-GRC, USA; A. Sayir, CWRU, USA

11:20 AM

Materials Engineering Challenges of Microbial Fuel Cells Utilizing a Novel Alkalophilic, Halophilic Dissimilatory-Iron Reducing Bacterium

D. J. Vidi*, M. R. Mormile, F. Dogan, University of Missouri-Rolla, USA

Energy: Fuel Cells: Materials, Processing, Manufacturing and Power Management Technologies

Cell Materials, Performance, Degradation, Manufacturing of High Temperature FCs II

Room: D2-14

Session Chairs: Abdul-Majeed Azad, University of Toledo; Prashant Kumta, Carnegie Mellon University

8:30 AM

Introductory Remarks

8:40 AM

Perovskite-related Intergrowth Oxide Cathodes for Intermediate Temperature Solid Oxide Fuel Cells

A. Manthiram*, K. Lee, J. Kim, University of Texas at Austin, USA

9:00 AM

Solid Oxide Fuel Cells (SOFC) from YSZ-Al₂O₃ Composite Electrolyte

J. S. Thokchom*, University of Dayton Research Institute, USA; H. Xiao, UES Corp., USA; M. Rottmayer, T. L. Reitz, Wright Patterson Air Force Base, USA; B. Kumar, University of Dayton Research Institute, USA

9:20 AM

Detailed Solid Oxide Fuel Cell (SOFC) Modeling

F. M. Zalar*, H. Verweij, The Ohio State University, USA

10:00 - 10:20 a.m.

Break

10:00 AM

Reaction Sintering of Yttria Stabilized Zirconia Anodes via Nickel Oxide

J. White*, I. E. Reimanis, Colorado School of Mines, USA; G. Coors, R. Swartzlander, CoorsTek, USA

10:20 AM

Fabrication of Cu-Ni-YSZ SOFC Anodes for Direct Oxidation of Hydrocarbon via Cu-Electroplating

E. Park*, H. Moon, S. Hyun, Yonsei University, South Korea

10:40 AM

The Influence of Reduction on the Microstructure and Elastic Properties of Ni-YSZ Anodes for SOFCs at Ambient and Elevated Temperatures

T. Nithyanantham*, S. Nambiappan Thangavel, S. Biswas, J. Zhang, S. Bandopadhyay, University of Alaska Fairbanks, USA

11:00 AM

Effect of H₂S on Performance of Ni-YSZ Anodes in Solid Oxide Fuel Cells

J. F. Rasmussen*, A. Hagen, Risoe National Laboratory, DTU, Denmark

11:20 AM

Production of a Bi-layer Electrolyte by Spray Pyrolysis Deposition for Solid Oxide Fuel Cells

J. D. Reding*, B. Angoua, E. B. Slamovich, Purdue University, USA

11:40 AM

The Properties and Performance of Micro-Tubular (less than 1mm od) Anode Supported SOFC's

N. M. Sammes*, A. Smirnova, A. Mohamadi, F. Serincen, University of Connecticut, USA

Fundamentals and Characterization: Characterization and Modeling of the Mechanical Performance of Advanced Alloys: Bridging the Data Gap

Formability of Advanced Automotive Alloys

Room: D0-07B

Session Chair: Stephen Banovic, NIST

8:30 AM

Introductory Remarks

8:40 AM

On the Development of Constitutive Models for Sheet Metal Forming (Invited)

A. J. Beaudoin*, University of Illinois at Urbana-Champaign, USA

9:00 AM

Determination of the Flow Stress and Formability of Sheet Materials under Biaxial Conditions, for Process Simulation and Quality Control

T. Altan*, H. Palaniswamy, A. Yadav, The Ohio State University, USA

9:20 AM

Determination of Flow Stress for Sheet Metals at Elevated Temperature

S. Mahabunphachai*, Y. Usta, M. Koc, Virginia Commonwealth University, USA

9:40 AM

Micromechanical Modelling of the Formability of Dual-Phase Steels

C. Kremaszky*, V. Espinoza, J. Ocenasek, E. Werner, TU-München, Germany; T. Hebesberger, A. Pichler, Voestalpine Stahl GmbH, Austria

10:00 - 10:20 a.m.

Break

10:20 AM

Prediction of Springback for a Channel Draw Process Using Different Hardening Models (Invited)

A. Taherizadeh, A. Ghaei, D. E. Green*, University of Windsor, Canada

10:40 AM

Springback Residual Stresses in Automotive Alloys

H. Prask*, T. Gnaeupel-Herold, NIST, USA

11:00 AM

Characterizing Residual Stress Gradients in Automotive Components via X-Ray Diffraction Mapping Techniques

J. Pineault*, M. Brauss, M. Belassel, Proto Mfg. Inc., USA; J. Ladouceur, Proto Mfg. Ltd., Canada

11:20 AM

Methodology for Controlling Springback and Die Temperature in Stamping AHSS

H. M. Shih*, United States Steel Corporation, USA

11:40 AM

Real Time Monitoring of Elastic Modulus during Heat Treatment

D. Pitchure*, R. Ricker, National Institute of Standards and Technology, USA

Fundamentals and Characterization: Discovery and Optimization of Materials through Computational Design

Bridging Lengthscales: Application of Multiscale Modeling to Materials Design I

Room: D0-05AB

Session Chair: Long-Qing Chen, Penn State University

8:30 AM

Introductory Remarks

8:40 AM

Computational Thermodynamics and its Role in Processing Design (Invited)

Z. Liu*, The Pennsylvania State University, USA

9:20 AM

Integrated Computational Materials Engineering: The Past, The Present and the Future (Invited)

J. Allison*, Ford Motor Co, USA

10:00 - 10:20 a.m.

Break

10:20 AM

From Schrödinger's Equations to the Rolling Mill: Predicting True Deformation Twinning Stresses (Invited)

D. D. Johnson*, S. Kibey, J. Liu, H. Sehitoglu, University of Illinois Urbana-Champaign, USA

11:00 AM

Discovery by Design: Fast Science (Invited)

G. B. Olson*, Northwestern University, USA

11:40 AM

The Calculated Interfacial Entropies for Al₂Cu/Al and Mg₅Si₆/Al

Y. Wang*, Z. Liu, L. Chen, Penn State, USA; C. Wolverton, Northwestern University, USA

Fundamentals and Characterization: Frontiers in Materials Science: Materials for Sports and Medicine

Sports, Prosthetics and Biocompatibility

Room: D0-03A

Session Chairs: James Earthman, UC Irvine; David Bahr, Washington State University

8:30 AM

Introductory Remarks

8:40 AM

The Influence of Materials Selection on the Performance of Sports Equipment

G. M. Michal*, Case Western Reserve University, USA

9:00 AM

Microstructure Characterization of Heat-Treated 7xxx-Series Al Carabiners After a Simulated Rock Climbing Fall

J. Carpenter*, M. M. Nowell, S. I. Wright, EDAX/TSL, USA

9:20 AM

Surface and Subsurface Damage in Intraoral Resurfacing of Ceramic Prostheses - In Vitro Study and Numerical Modeling

X. Song, Tianjin University, China; L. Yin*, Australian National University, Australia; Y. Han, H. Wang, J. Li, Tianjin University, China

9:40 AM

Formation of Biomimetic Porous Calcium Phosphate Coatings on Surfaces of Polyethylene/Zinc Stearate Blends

J. Drelich*, K. G. Field, Michigan Technological University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Nanocrystalline Tricalcium Phosphate - A Novel Drug Carrier

S. Dasgupta*, A. Bandyopadhyay, S. Bose, Washington State University, USA

10:40 AM

Tensile Deformation Behavior of Epoxy Composites Reinforced With Three Different Woven Fabrics

A. A. Mazen*, El Menia University, Egypt; M. A. Abdel Ghafaar, N. A. El Mahallawy, Ain Shams University, Egypt

Fundamentals and Characterization: International Symposium on Defects, Transport and Related Phenomena

Transport II

Room: D0-03C

Session Chairs: Rotraut Merkle, MPI for Solid State Research; Natsuko Sakai, National Institute of Advanced Industrial Science and Technology

8:30 AM

Introductory Remarks

8:40 AM

(BaxSr_{1-x})(FeyCo_{1-y})O_{3-d}: Investigation of Chemical and Electrochemical Oxygen Incorporation Kinetics (Invited)

R. Merkle*, L. Wang, G. Cristiani, J. Maier, MPI for Solid State Research, Germany

Tuesday AM

9:20 AM

Transport and Capacitance Behavior of CuO/ZnO Heterocontacts in the Presence of Hydrogen (Invited)

D. Cann*, Oregon State University, USA; S. Aygun, North Carolina State University, USA; S. Kwon, Oregon State University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Mass Transport and Degradation in Materials of Solid Oxide Fuel Cells Stacks (Invited)

N. Sakai*, H. Kishimoto, K. Yamaji, T. Horita, M. E. Brito, H. Yokokawa, National Institute of Advanced Industrial Science and Technology, Japan

11:00 AM

Grain Boundary Diffusion in SOFC Materials and the Effect on Space-Charge Properties

S. J. Litzelman*, Massachusetts Institute of Technology, USA; R. A. De Souza, M. Martin, RWTH Aachen University, Germany; H. L. Tuller, Massachusetts Institute of Technology, USA

11:20 AM

Characterization of Thin Film Monolithic Phosphosilicate Proton Exchange Membranes

A. A. Feldman*, J. Kieffer, University of Michigan, USA

11:40 AM

Cation Diffusion in Perovskites

M. Martin*, RWTH Aachen University, Germany

Fundamentals and Characterization: Phase Stability, Diffusion and Their Applications

Phase Transformations, Amorphization, and Diffusion in Oxides

Room: D0-04ABC

Session Chairs: Yongho Sohn, University of Central Florida; Philippe Maugis, Arcelor Research

8:30 AM

Introductory Remarks

8:40 AM

Simulations of Precipitation in Alloys

H. Strandlund*, X. Lu, Q. Chen, A. Engström, Thermo-Calc Software AB, Sweden

9:00 AM

Microstructural Simulation of Phase Decomposition in Isothermally-Aged Cu-Ni Alloys

E. O. Avila-Davila*, D. V. Melo-Maximo, O. Soriano-Vargas, V. M. Lopez-Hirata, M. L. Saucedo-Muñoz, J. L. Gonzalez-Velazquez, Instituto Politecnico Nacional (ESIQIE), Mexico

9:20 AM

A Thermodynamic Understanding of Solid State Amorphization in Ti-based Alloys

E. A. Lass*, G. J. Shiflet, W. C. Johnson, University of Virginia, USA

9:40 AM

Characterization of an Mg-Based Amorphous-Crystalline Composite Cast in Air

K. Findley*, L. Deibler, Washington State University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

The effect of a diffusional singularity on the microstructure of two phase diffusion couples

X. Pan*, J. E. Morral, Y. Wang, The Ohio State University, USA

10:40 AM

Modelling and Simulation of Diffusion in Iron Chromium Oxides

S. Hallstrom*, L. Hoglund, J. Agren, Materials Science and Engineering, Sweden

11:00 AM

An Experimental Approach to Quantification of Solute-Drag Effects

S. Dillon*, M. P. Harmer, Lehigh University, USA

11:20 AM

EXAFS Studies of the Structural Features of Grain Boundary Complexions in Alumina

S. Behera*, G. Cargill, M. P. Harmer, Lehigh University, USA

11:40 AM

Effect of Yttrium on Oxygen Grain Boundary Diffusion in Alumina Using Ni Particles as Markers

H. Cheng*, H. S. Caram, J. M. Rickman, H. M. Chan, M. P. Harmer, Lehigh University, USA

Fundamentals and Characterization: What We can Learn from Failure Analysis

Fatigue & Fracture I

Room: D0-01A

Session Chairs: Michael Stevenson, MME; Dustin Turnquist, Engineering Systems Incorporated

8:30 AM

Introductory Remarks

8:40 AM

Puncture Resistance of Self-Pressurized Containers

M. Fox*, Chemical Accident Reconstruction Services, Inc., USA

9:00 AM

Nondestructive Determination of Fracture Toughness Using ABI (Invited)

F. Haggag*, Advanced Technology Corporation, USA

9:40 AM

A Simple Finite Element Model For Predicting Spur Gear Tooth Failure (Invited)

J. Raphael*, C M Hoist, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Fracture Surface Cleaning for Failure Analyses and Legal Cases (Invited)

J. M. Tartaglia*, Stork Climax Research Services, USA

10:40 AM

Failure Modes of Electrical Resistance Spot Welds (Invited)

M. E. Barkey*, The University of Alabama, USA; M. E. Stevenson, Metals and Materials Engineers, USA

11:20 AM

An Inadequate Weld Repair and a Consequent Rupture of a Pressure Vessel (Invited)

T. Jur*, K. T. Minden, Engineering Design & Testing Corp., USA

Materials and Systems: Coatings as an Enabler of System Performance

Environmental Barrier Coatings/Erosion I

Room: O2-38

Session Chairs: Rodney Trice, Purdue University; Dongming Zhu, NASA Glenn Research Center

8:30 AM

Introductory Remarks

8:40 AM

Protective Coatings Guided by Model Development (Invited)

V. Ravi*, T. Nguyen, California State Polytechnic University, USA

9:20 AM

Characterization of Cerium Conversion Coated Al 7075-T6 Prepared with Alkaline and Acidic Cleaning Solutions

S. Joshi*, W. R. Pinc, M. O'Keefe, T. O'Keefe, S. Geng, W. Fahrenholtz, University of Missouri - Rolla, USA

9:40 AM

Effects of Acidic and Alkaline based Surface Preparations of Al 2024-T3 on Spray Deposited Cerium-Oxide Conversion Coatings

W. Pinc*, S. Joshi, S. Geng, M. O'Keefe, W. Fahrenholtz, T. O'Keefe, University of Missouri-Rolla, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Corrosion Resistance Properties of Micro Arc Oxidation Coatings Deposited on Diverse Magnesium Alloy Substrates (Invited)

G. G.Sundararajan*, ARCI, India

11:00 AM

Corrosion Behavior of Cerium based Conversion Coatings on Al 2024-T3 Alloy

S. Geng*, P. Yu, M. O'Keefe, W. Fahrenholtz, T. O'Keefe, University of Missouri-Rolla, USA

11:20 AM

Corrosion Protection for Steel and Aluminum Alloys

H. G. Wheat*, G. Liu, University of Texas at Austin, USA

11:40 AM

Corrosion-Resistant Coatings on Metals from Pre ceramic Polymers

B. MacQueen*, Y. Blum, SRI International, USA; D. McCaffrey, Magni Industries, Inc., USA

Materials and Systems: Commonality of Phenomena in Composite Materials

Particle Reinforced Composites

Room: O2-37

Session Chairs: Edgar Lara-Curzio, Oak Ridge National Lab; Waltraud Kriven, University of Illinois at Urbana-Champaign

8:30 AM

Introductory Remarks

8:40 AM

Strong, Hard and Tough, High Temperature Stable, Multi-phase Ceramic Composites with Retarded Grain Growth (Invited)

D. K. Kim, W. M. Kriven*, University of Illinois at Urbana-Champaign, USA

9:20 AM

High Damping Behavior of Electroformed Ferroelectric Ceramic Reinforced Metal Matrix Composites

B. D. Poquette*, S. L. Kampe, J. P. Schultz, T. Asare, Virginia Tech, USA

9:40 AM

Reinforcement Homogeneity and the Fracture of Discontinuously Reinforced Aluminum

G. B. Wilks*, General Dynamics, USA; J. E. Spowart, Air Force Research Laboratory, USA; D. A. Koss, Penn State University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Computer Simulations of Complex Realistic Three-Dimensional Microstructures

Y. Mao*, A. M. Gokhale, H. Singh, S. Lieberman, Georgia Institute of Technology, USA

10:40 AM

The Mechanical Response of Individual Silicon Particles in Al/Si Alloys under Cyclic Nanoindentation

S. Xia*, Brown University, USA; Y. Qi, T. Perry, GM Research & Development Center, USA; K. Kim, Brown University, USA

11:00 AM

A Novel Explanation of Void Morphology in the Low Profile Additives (LPA) Based Composite Material

M. Saraswat*, K. Jansen, L. J. Ernst, Technical University of Delft, Netherlands

11:20 AM

Particulate reinforced Metal Matrix Composites: A Review

A. Ahmed*, A. J. Neely, K. Shankar, University of New South Wales @ADFA, Australia

11:40 AM

Mechanically Milled Al Base MMC Reinforced with Intermetallics

M. Adamiak*, Silesian University of Technology, Poland

Materials and Systems: Glass and Optical Materials

Crystalline and Glass-Ceramic Systems

Room: O2-39

Session Chair: Steve Martin, Iowa State University

8:30 AM

Introductory Remarks

8:40 AM

YAG Composites for Solid State Lasers

J. E. Sundeen*, Northrop Grumman Corporation, USA

9:00 AM

Second Phase Precipitates Formed in Polycrystalline YAG for Laser Applications

A. Bellou*, D. F. Bahr, Washington State University, USA

9:20 AM

Thermally Induced Phase Transition Effects on the Optical Performance of KDP Single Crystals

J. Villone*, B. Potter, University of Arizona, USA; W. J. Thomes, Sandia National Laboratories, USA

9:40 AM

Dielectric Constant and Loss Tan Delta Data for THz Materials: Selenide and Telluride Crystals

N. B. Singh*, Northrop Grumman Corporation, USA; R. N. Singh, University of Cincinnati, USA; M. Gottlieb, D. Suhre, A. Berghmans, D. Kahler, J. Hawkins, Northrop Grumman Corporation, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Processing and Characterization of a Glass-Ceramic System with Tailorable Mechanical Properties

R. P. Koseski*, J. Hellmann, B. Scheetz, Penn State University, USA; J. Nicolas, Ecole Nationale Supérieure de Céramique Industrielle, France

10:40 AM

Atomic Force Microscopy Resolution Limitations in Studying Phase Separation in Silicate Glass

A. B. Crawford*, A. G. Clare, Alfred University, USA

Glass Science

Room: O2-39

Session Chair: Mario Affatigato, Coe College

11:00 AM

Effects of Fictive Temperature Dependence of Specific Volume on Mechanical Properties of Glasses

T. M. Gross*, M. Tomozawa, Rensselaer Polytechnic Institute, USA

11:20 AM

Absolute Quantification of Amorphous Phase Composition During Glass Melting Using In-situ X-ray Diffraction

E. A. Ordway*, S. T. Misture, Alfred University, USA

11:40 AM

Nanoindentation Studies on Glass Surfaces

P. Kolluru*, D. Green, C. Pantano, C. L. Muhlstein, The Pennsylvania State University, USA

Materials and Systems: Iron-Based Amorphous Metals: An Important Family of High-Performance Corrosion-Resistant Materials

Introduction and Plenary II

Room: O2-40

Session Chairs: Joseph Farmer, Lawrence Livermore National Laboratory; Patrice Turchi, Lawrence Livermore National Lab; John Perepezko, University of Wisconsin-Madison

8:30 AM

Introductory Remarks

Patrice Turchi

8:40 AM

Compositions of Fe-Based Structural Amorphous Metals and Their Mechanical Properties (Invited)

J. Poon*, G. J. Shiflet, University of Virginia, USA

Synthesis, Characterization, Phase Stability & Neutronics II

Room: O2-40

Session Chairs: Larry Kaufman, CALPHAD, Inc; Patrice Turchi, Lawrence Livermore National Lab

9:20 AM

Spark Plasma Sintering of Fe-Based Structural Amorphous Metals (SAM) with Y_2O_3 Nanoparticle Additions (Invited)

O. A. Graeve*, R. Kanakala, K. Sinha, University of Nevada, Reno, USA; L. Kaufman, CALPHAD, Inc., USA; E. Wang, B. Pearson, University of Nevada, Reno, USA; J. C. Farmer, Lawrence Livermore National Laboratory, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Neutron-Absorbing Coatings for Safe Storage of Fissile Materials with Enhanced Shielding and Criticality Safety

J. Choi*, J. C. Farmer, C. Lee, L. Fischer, Lawrence Livermore National Laboratory, USA

Atomization, Thermal Spray & Applications I

Room: O2-40

Session Chair: Larry Kaufman, CALPHAD, Inc

10:40 AM

Applications in the Nuclear Industry for Thermal Spray Amorphous Metal and Ceramic Coatings (Invited)

J. C. Farmer*, J. Choi, Lawrence Livermore National Laboratory, USA

11:00 AM

Production of High Density SAM2X5 HVOF Coatings (Invited)

D. Branagan*, B. Meacham, The NanoSteel Company, USA; D. Haggard, D. Swank, Idaho National Laboratory, USA

11:40 AM

Manufacturing Status of an Iron Based Amorphous Alloy

D. J. Novotnak*, L. W. Lherbier, Carpenter Powder Products, USA

Nanotechnology: Materials Characterization at the Nanoscale: Instrumentation and Applications

Optical and Magnetic Methods

Room: W2-61

Session Chair: Lawrence Cook, NIST

8:30 AM

Introductory Remarks

8:40 AM

Nano-Optics for Chemical and Materials Characterization (Invited)

S. J. Stranick*, NIST, USA

9:20 AM

Nanoscale Magnetic Characterization Tools (Invited)

H. Bluhm*, K. A. Moler, Stanford University, USA

10:00 - 10:20 a.m.

Break

Thermoanalytical Methods

Room: W2-61

Session Chair: Lawrence Cook, NIST

10:20 AM

NanoDSC Instrumentation and Application for Characterization of Ultra-thin Layers of Material and Nanoparticles (Invited)

L. Allen*, University of Illinois, USA

11:00 AM

On the Existence of Nanoclusters in Thermally-Cycled Gallium Alloys of Complex Compositions and Their Effects on Phase Transitions

M. P. Marya*, Schlumberger Technology Corporation, USA

11:20 AM

**Nano-Thermal Analysis and Atomic Force Microscopy
Characterization of Expanded Graphite Nanoplatelets (xGnP™)
Polymer Nanocomposites**

D. G. Miloaga*, H. A. Hosein, Michigan State University, USA; K. Kjoller, Anasys Instruments, USA; M. Misra, L. T. Drzal, Michigan State University, USA

11:40 AM

Investigation of the Ni/Si Interfacial Reaction by MEMS-DSC

L. Cook*, R. Cavicchi, M. Vaudin, N. Bassim, R. Kummamuru, W. Egelhoff, NIST, USA; M. Efremov, University of Wisconsin, USA; L. Hu, University of Illinois, USA; C. Montgomery, W. Wong-Ng, NIST, USA; L. Allen, University of Illinois, USA; M. Green, NIST, USA

**Nanotechnology: Nano-Processing -
Property Enhancement by Quantum
Confinement and Other Effects in
Reduced Dimensions**

**Property Enhancement in Reduced
Dimensions I**

Room: W2-58

Session Chair: Bipradas Dutta, Catholic University

8:30 AM

Introductory Remarks

8:40 AM

**Engineering the Thermoelectric Behavior in Nanodots,
Nanowires, and Polycrystalline Materials**

M. J. Howell, E. Garcia*, T. Sands, Purdue University, USA

9:00 AM

Quantum Dots and QED

T. Prevenslik*, Consultant, Germany

9:20 AM

**Mechanically-Induced Allotropic Transformation in
Nanocrystalline Hafnium**

U. R. Seelam*, C. Suryanarayana, University of Central Florida, USA

9:40 AM

**Study on the Synthesis of Ni Nanoparticles Utilizing Hydrolysis
Behaviour of Ni Magnides and Aluminides**

H. Wang*, D. O. Northwood, University of Windsor, Canada

10:00 - 10:20 a.m.

Break

10:20 AM

Effect of Additives on the Thermoelectric Properties of Bulk PbTe

S. Annamalai*, J. Battogtokh, I. L. Pegg, B. Dutta, The Catholic University of America, USA

10:40 AM

**Amorphous Coating AlN Dispersoids Strengthened Nano Al
Composite**

O. L. Vatamanu*, A. Sherman, B. Doud, Powdermet Inc., USA

11:00 AM

**Photoluminescence Intensity Enhancement of ZnS
Nanoparticles Prepared by Exploding Wire Technique**

N. Goswami*, Jaypee Institute of Information Technology University, India

**Nanotechnology: Nanostructured Ceramic
Materials: Science and Technology**

**Synthesis and Processing of Nanopowders,
Nanostructures, and Nanocomposites II**

Room: W2-67

Session Chair: Burtrand Lee, Clemson Univ.

8:30 AM

Introductory Remarks

8:40 AM

**Investigations on the Mechanical Properties of Densified
Al₂O₃/ZrO₂/TiC Composites Obtained Using Different Sintering
Techniques (Invited)**

G. Sundararajan*, D. Chakravarty, R. Subashri, ARCI, India

9:20 AM

**Particle Surface Modification for Improved Properties and
Applications (Invited)**

R. Partch*, Clarkson University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

**Development of Nano-Structural Thin Films for Potential
Applications**

R. Dachevall*, Osmania University, India

10:40 AM

**Issues Regarding the Optimization of Nanostructured Ceramics
Prepared from Nanopowders: Lessons Along the Way**

A. C. Sutorik*, Y. Tang, M. Paras, L. Nguyen, C. Zyskowski, Nanocerox, USA

11:00 AM

**Nanostructuring Processes During Cold Gas Dynamic Spray of
Al and Ni Based Composites**

E. Maeva*, E. Leshchinsky, M. Lubrick, University of Windsor, Canada

11:20 AM

Semiconducting Ba_{1-x}Sr_xTiO₃ Synthesized at 1050C

W. Wu*, K. Jones, F. Zheng, Y. Liu, Y. Gao, Florida International University, USA

11:40 AM

**Bulk Nanostructured Titanium Boride (TiB) Ceramic: Synthesis
and Properties**

S. Madtha, K. Chandran*, University of Utah, USA

**Nanotechnology: Mechanics of
Nanomaterials and Micro/Nanodevices -
Experimental and Modeling**

**Mechanics of Nanomaterials and
Micro/Nanodevices-III**

Room: W2-68

Session Chairs: Brad Boyce, Sandia National Laboratories; Fuqian Yang, University of Kentucky

8:30 AM

Introductory Remarks

Tuesday AM

MS&T'07[®]

8:40 AM

4-d SPM: Simple NanoMechanical Mapping

D. Shuman, R. Nath, M. Zhao, N. Polomoff, K. Bagnoli, B. D. Huey*, University of Connecticut, USA

9:00 AM

Development of Standard Reference Data for Instrumented Indentation Testing

L. Lum*, D. Morris, R. Cook, National Institute of Standards and Technology, USA

9:20 AM

Determining Viscoelastic Properties by Instrumented Indentation (Invited)

Y. Cheng*, Purdue University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Micro and Nano Indentation and Scratch Tests of Metals

N. V. Gitis*, I. Hermann, M. Vinogradov, CETR, USA

10:40 AM

Influence of Initial Defect Size, Shape, and Location on Crack Growth and Fracture Behavior of Metal Foils

D. Yang*, Q. Xiao, F. Tsuchiya, T. J. Wyrubek, Hysitron, Inc., USA

11:00 AM

Nanoscale Elastic Property Measurements Using Atomic Force Microscopy: ZnO Nanowires (Invited)

R. F. Cook*, G. Stan, NIST, USA

11:40 AM

Measuring Residual Stress in Glasses and Ceramics using Instrumented Indentation (Invited)

T. E. Buchheit*, R. Tandon, Sandia National Laboratories, USA

Processing and Product Manufacturing: Advances in Cement-Based Materials: Manufacturing, Hydration, Admixture Interaction, Properties/Characterization, Modeling and Degradation/Durability

Next Generation and Novel Cement-Based Materials

Room: O2-36

Session Chair: Florence Sanchez, Vanderbilt University

8:30 AM

Introductory Remarks

8:40 AM

Energy Absorbing Cementitious Materials for Damping Applications (Invited)

Z. C. Grasley*, Texas A&M Univ., USA

9:00 AM

Microstructure and Performance of Fly Ash Sinking Beads in Cementitious System

H. Li*, D. Xu, F. Cheng, S. Feng, B. Shang, Xi'an University of Architecture and Technology, China

9:20 AM

Strength Evolution in Phosphate-Bonded Metakaolins

J. M. Boyce*, J. R. Hellmann, B. E. Scheetz, The Pennsylvania State University, USA

9:40 AM

Effects of Processing Parameters on the Mechanical Properties of Gypsum-Based Materials

Z. Chen*, K. T. Faber, Northwestern University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Theory and Practice of Simulation of Rock Formation

X. Feng*, H. Sun, Z. Yi, Tsinghua University, China

10:40 AM

Composition and Microstructure of Geopolymer with Alkali Activation Fly Ash

H. Li, Y. J. Zhang*, D. Xu, Xi'an University of Architecture and Technology, China

11:00 AM

Study on the Evaluation of Activity of Iron Tailing by Thermal Activation

Z. Yi*, H. Sun, Tsinghua University, China; X. Wei, China University of Mining & Technology (Beijing), China

11:20 AM

Synthetic Portland Cement from Waste Materials

M. Juenger*, I. A. Chen, The University of Texas at Austin, USA

Processing and Product Manufacturing: Innovative Processing and Synthesis of Ceramics, Glasses and Composites

Coatings and Films

Room: O2-33

Session Chair: Takashi Goto, Institute for Materials Research

8:30 AM

Introductory Remarks

8:40 AM

Innovative Processing and Engineering of Ceramic Top-Coats in Thermal Barrier Coatings (Invited)

N. P. Padture*, The Ohio State University, USA

9:20 AM

Factors Promoting High Density in the Solution Precursor Plasma Spray of Dense Nano Scale Materials

E. H. Jordan*, D. Chen, M. Gell, B. Cetegen, S. Basu, University of Connecticut, USA

9:40 AM

Microstructure Development in Monodisperse Latex/Ceramic Nanoparticle Coatings

H. Luo, L. Scriven, L. F. Francis*, University of Minnesota, USA

10:00 - 10:20 a.m.

Break

10:20 AM

High-Speed Preparation of Titania Films by Laser Chemical Vapor Deposition (Invited)

T. Goto*, T. Kimura, Tohoku University, Japan

11:00 AM

Effect of the Kinetic Parameters on the Coating Performance of Ni-P Nano-Composite Alloy Coatings

A. H. Makhlofi*, Boise State University, USA; M. Shoeib, Central Metallurgical Research and Development Institute, CMRDI, P.O. Box: 87, Helwan, Cairo, Egypt, Egypt; H. Hady, Saqr Factory for Advanced Militaries Industries, Egypt; O. F. Abdel Salam, University of Cairo, Egypt

Tuesday AM

11:20 AM

Influence of Process Parameters on Surface Quality of Ni-based Composite Coatings Deposited Using Low Pressure Gas Dynamic Spray Process

V. Leshchynsky*, K. Y. Sastry, A. Kagan, E. Strumban, R. Gr. Maev, University of Windsor, Canada

11:40 AM

Epitaxial V2O3 Thin-Films on a-Plane (110) and c-Plane (001) Al2O3 via Pulsed Laser Deposition Technique

B. S. Allimi*, P. Alpay, University of Connecticut, USA

Processing and Product Manufacturing: Joining of Advanced and Specialty Materials IX

Repair and Manufacture of Industrial Gas Turbines and Aero-engine Components

Room: O2-35

Session Chairs: John Smugeresky, Sandia National Laboratories; John Dupont, Lehigh University

8:30 AM

Introductory Remarks

8:40 AM

Laser Weld Repair of Single Crystal Ni-base Superalloys

T. Anderson*, J. N. DuPont, Lehigh University, USA

9:00 AM

Repair Welding of Large Nodular Iron Castings for Stationary Gas Turbines

S. Janssen*, SIEMENS Power Generation, Germany

9:20 AM

Pulsed-Laser Deposition of Directionally Solidified Superalloys for Turbine Applications

K. Osawa, Mitsubishi Heavy Industries, Japan; A. Deceuster, L. Li*, Utah State University, USA

9:40 AM

Evaluation of Repair Weldability in Ni-Base Aerospace Alloys by the Cast Pin Tear Test

B. T. Alexandrov*, Ohio State University, USA; N. E. Nissley, ExxonMobil, USA; J. C. Lippold, Ohio State University, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Laser Powder Deposition for Making Functional Net-Shape Parts and Repairing Damaged Gas Turbine Components

L. Xue*, J. Chen, S. Wang, Y. Li, National Research Council Canada, Canada

10:40 AM

Repair Opportunities for Industrial Gas Turbine Engine Components through Laser Powder Deposition

J. W. Sears*, South Dakota School of Mines & Technology, USA

11:00 AM

Fatigue Reliability of Repaired Integrally Bladed Rotors (IBRs)

R. Tryon, R. Holmes, G. Krishnan, R. V. Pulikollu*, VEXTÉC, USA

11:20 AM

Refurbishing Turbine Parts with LENS®, A Synergistic Materials Processing and Repair Technology

J. Smugeresky*, D. Gill, C. J. Atwood, Sandia National Laboratories, USA

11:40 AM

Processing Parameters Impact on Microstructure of Laser Drilled Waspaloy and Hastelloy X

R. Bright*, J. K. McGuinness, C. Weiss, M. Aindow, H. Marcus, University of Connecticut, USA

Processing and Product Manufacturing: Surface Engineering Using Hybrid Plasma Assisted PVD and CVD Technologies

Diagnostics; Process Optimization; Ion Assisted Deposition

Room: O2-41

Session Chair: Paul Gannon, Montana State University

8:30 AM

Introductory Remarks

8:40 AM

Hybrid PVD Processes and Plasma Diagnostic for Nanostructured Coating Growth (Invited)

A. Voevodin, J. Jones*, C. Muratore, A. Waite, Air Force Research Laboratory, USA

9:20 AM

Measurement of Plasma Temperature in an Air Plasma Spray Plume using Optical Spectrometry

R. Williamson*, J. Perovitch, A. C. Hall, Sandia National Laboratories, USA

9:40 AM

Solving an Anode Burning Problem in a Low Pressure Plasma Spray System

A. C. Hall*, R. Williamson, Sandia National Laboratories, USA; E. Muhelberger, Sultzer-Metco, USA; D. Hirschfeld, New Mexico Institute of Mining and Technology, USA; T. Roemer, D. Beatty, A. J. Mayer, Ktech Corporation, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Coating of Large Areas by Plasma Activated Electron Beam PVD Technologies

F. Roegner*, C. Metzner, Fraunhofer Institute of Electron Beam and Plasma Technology, Germany

The Profound Influence of Tony Evans on Engineering Use of Structural Materials

Mechanics of Materials System

Room: M2-29

Session Chair: Sheldon Wiederhorn, National Institute of Standards and Technology

7:55 AM

Introductory Remarks

8:00 AM

Sandwich Panels for Blast Protection in Water and Air: Simulations (Invited)

R. McMeeking*, A. Spuskanyuk, M. He, University of California, USA

8:40 AM

Lattice Materials and their Response to High Intensity Dynamic Loading (Invited)

H. N. Wadley*, University of Virginia, USA

Tuesday AM

9:20 AM

Dynamic Failure of Impulsively Loaded Metallic Sandwich Panels (Invited)

F. W. Zok*, University of California, USA

10:00 - 10:20 a.m.

Break

10:20 AM

Chipping (Invited)

B. Lawn*, H. Chai, NIST, USA

11:00 AM

Do Plastic Zones form at Crack Tips in Silicate Glasses? (Invited)

S. M. Wiederhorn*, National Institute of Standards and Technology, USA; T. Fett, Universitat Karlsruhe, Germany; J. Guin, Universite de Rennes 1, France

11:40 AM

Further Considerations on the Mechanisms for Fatigue Failure in Micron-Scale Silicon Structural Films (Invited)

R. O. Ritchie*, D. Alsem, University of California, Berkeley, USA; E. A. Stach, Purdue University, USA

Richard M. Fulrath Award Session

Room: D0-06AB

Session Chair: David Marshall, Teledyne Scientific

8:30 AM

Introductory Remarks

8:40 AM

Mesoscopic Complex-Structure Control for Property Enhancement in Perovskite Ferroelectrics (Invited)

S. Wada*, University of Yamanashi, Japan

9:20 AM

Novel CO₂ Absorbents using Lithium-Containing Oxide (Invited)

M. Kato*, Toshiba Corporation, Japan

9:40 AM

Silicon Carbide Composites for Nuclear Applications (Invited)

L. Snead*, Y. Katoh, T. Nozawa, Oak Ridge National Lab, USA; A. Kohyama, T. Hinoki, Kyoto University, Japan; R. Lowden, S. J. Zinkle, Oak Ridge National Lab, USA; T. Taguchi, Japan Atomic Energy Research Institute, Japan

10:00 - 10:20 a.m.

Break

10:20 AM

Materials and Lattice Vibration (Invited)

T. Shimada*, Advanced Electronics Research Laboratory, Japan

10:40 AM

Novel Concepts in 1-D, 2-D, and 3-D Functional and Structural Nanoceramics: Nanowires, Nanotubes, Thin Films, and Nanocomposites (Invited)

N. P. Padture*, The Ohio State University, USA

Special Topics: Industry Track 2007

Industry Track I

Room: D1

Session Chair: Richard Schorr, MetaMateria

11:00 AM

Development of a Technology to Produce Ceramic Fiber and Ceramic Fiber Composites for Energy Harvesting and Structural Reinforcement (Invited)

R. Cass*, Jerry Ruddle, Advanced Cerametrics, Inc., USA

Steel: Recent Developments in Steel Processing

Thermomechanical Processing

Room: W2-69

Session Chair: Riad Asfahani, U.S. Steel

8:30 AM

Introductory Remarks

8:40 AM

Simulation and Development of Advanced High Strength Steels on a Hot Strip Mill Using a Microstructure Evolution Model

R. Shulkosky*, INTEG Process Group, Inc., USA; M. Ibrahim, Lake Erie Steel GP Inc. (A Stelco Company), Canada

9:00 AM

Quantifying the Heat Transfer that Occurs During Run-Out Table (ROT) Cooling of Steel Plates

M. A. Wells*, V. Prodanovic, M. Millitzer, University of British Columbia, Canada

9:20 AM

Influence of the Chemical Composition on Transformation Behavior of Low Carbon Microalloyed Steels under Continuous Cooling

J. Calvo*, A. Elwazri, S. Yue, McGill University, Canada

9:40 AM

Effects of Alloying Elements on Microstructure and Mechanical Properties of Microalloyed Steels Undergoing Cool Deformation

A. Fatehi*, A. Elwazri, J. Calvo, S. Yue, McGill University, Canada

10:00 - 10:20 a.m.

Break

10:20 AM

Thermomechanical Processing Effects on the Elevated Temperature Behavior of Niobium Bearing Fire-Resistant Steel

R. W. Regier*, J. G. Speer, D. K. Matlock, Colorado School of Mines, USA; A. Bailey, Chaparral Steel, USA; S. Jansto, Reference Metals Company, USA

10:40 AM

Microstructure and Mechanical Properties of High Strength Linepipe Steels

D. Bai*, L. Collins, F. Hamad, X. Chen, R. Klein, IPSCO Inc., USA

11:00 AM

The Microstructure and Strengthening Behavior of V-N Steels during Hot Strip Mill Simulation

M. Hua, C. Garcia, University of Pittsburgh, USA; M. K. Miller, Oak Ridge National Laboratory, USA; R. J. Glodowski, Stratcor, Inc., A Subsidiary of Strategic Minerals Corporation, USA; A. J. DeArdo*, University of Pittsburgh, USA

11:20 AM

Thermomechanical Treatment of Nb-Microalloyed Weather Resistant Steel

S. N. Prasad*, Steel Authority of India Ltd., India

TMS Young Leaders Tutorial Luncheon & Lecture

Room: O2-44

12:00 - 1:00 p.m.

Lunch

1:00 PM

Design of New Materials to Address Critical Needs (Invited)

J. Economy*, University of Illinois at Urbana-Champaign, USA

Edward DeMille Campbell Memorial Lectureship

Room: O3-46

Introductory Remarks – Roger Fabian, ASM Board of Trustees

12:45 PM

Designing Functional Materials (Invited)

S. Mahajan*, Arizona State University, USA

ACerS Edward Orton Jr. Memorial Lecture

Room: M2-30

Introductory Remarks – Greg Hilmas, University of Missouri-Rolla

1:00 PM

Micro-Ionics: A Revolution in Portable Power Generation and Environmental Sensing (Invited)

H. L. Tuller*, Massachusetts Institute of Technology, USA

Special Topics: Industry Track 2007

Industry Track II

Room: D1

Session Chair: Richard Schorr, MetaMateria

2:00 PM

Small Bulb. Big Difference.™ (Invited)

M. A. Stough*, C. Labant, OSRAM Sylvania, USA

2:30 PM

Managing Technology Assets - Maximizing Value Opportunities (Invited)

K. Blakely*, NanoDynamics, Inc., USA

3:00 PM

Characterizing the Automobile Materials Selection Decision Making Process

R. Cirincione*, R. Roth, F. Field, R. Kirchain, MIT, USA

3:30 PM

The Role of Codes and Standards in New Materials Introduction

J. F. Grubb*, ATI Allegheny Ludlum, USA

Automotive: Automotive and Ground Vehicles: Applications of Materials to Vehicle Designs

Multifunctional Materials II

Room: W2-63

Session Chairs: Stephen Copley, The Pennsylvania State University; John McDonald, General Motors

2:00 PM

Introductory Remarks

2:10 PM

Laser-Welded Metallic Sandwich Panel Structures: An Overview

S. M. Copley*, Penn State, USA

2:30 PM

Optimization of Weight of LASCELL™ Sandwich Panels

C. Denomme*, S. G. Sollenberger, S. M. Copley, The Pennsylvania State University, USA

2:50 PM

Investigation of the Behavior LASCELL™, Sandwich Panels by Finite Element Analysis (FEA)

D. B. Wess*, S. M. Copley, The Pennsylvania State University, USA

3:10 PM

Analysis of Behavior of Laser-Welded Square and Rectangular Honeycomb Sandwich Panels, LASCELL™, Subjected to Bending and Uniform Pressure Loads

E. Ventsel*, S. M. Copley, P. J. Vigna, The Pennsylvania State University, USA

3:50 PM

Application Development for Use of LASCOR Panels (Invited)

K. M. Stefanick*, R. Spangler, Concurrent Technologies Corp, USA; F. Wells, Northrop Grumman Newport News, USA; J. Stainback, Naval Surface Warfare Center, USA

4:10 PM

The Cost of LASCELL™ Panels and Their Integration into Complex Engineering Structures

S. M. Copley*, C. R. Denomme, C. A. Sills, The Pennsylvania State University, USA

4:30 PM

Costs and Weight Savings of Lightweighting Vehicle Closure Subsystems

T. Montalbo*, Massachusetts Institute of Technology, USA; T. Lee, General Motors, USA; A. N. Allen, A. Kar, R. Cirincione, R. Roth, R. Kirchain, Massachusetts Institute of Technology, USA

4:50 PM

The Development of Low-Cost Titanium Powder Processing (Invited)

C. Lavender*, S. Weil, Y. Hovanski, M. T. Smith, Battelle Memorial Institute - Pacific Northwest National Laboratory, USA

Tuesday AM/PM

Automotive: Automotive and Ground Vehicles: Materials and Processes for Vehicles

Aluminum: Alloy Development and Microstructure

Room: W2-62

Session Chair: Paul Krajewski, General Motors

2:00 PM

Introductory Remarks

2:10 PM

FusionTM Product Development for Automotive Applications

M. J. Bull*, Novelis Corp., USA

2:30 PM

Extrinsic Effects on Annealing in Polycrystalline Microstructures: Atomic-scale Computer Simulations (Invited)

M. Upmanyu*, Colorado School of Mines, USA

2:50 PM

Development of Recycle-Friendly Automotive Aluminum Alloys

S. K. Das*, J. G. Kaufman, Secat, Inc., USA

3:10 PM

Microstructure Effects on Cavitation of AA5083 Sheet during Hot Forming

J. Chang*, E. M. Taleff, The University of Texas at Austin, USA; P. E. Krajewski, General Motors Corp., USA

3:50 PM

Superplastic Behavior of AA5083 Processed by Rolling and Friction Stir Processing

M. F. Thompson, M. T. Bland, S. Swaminathan, J. Q. Su, T. R. McNelley*, Naval Postgraduate School, USA

4:10 PM

Texture Variation in a Heat Treated Heavily Deformed Aluminum Alloy 6061

S. Adedokun*, FAMU-FSU College of Engineering, USA; H. Garmestani, Georgia Institute of Technology, USA; J. Schwartz, FAMU-FSU College of Engineering, USA

4:30 PM

Shear Localization and Damage in Automotive Aluminum Alloy AA5754 Sheets

J. Kang*, D. S. Wilkinson, M. Jain, M. Bruhis, McMaster University, Canada

4:50 PM

Fatigue of Extruded AA6082

N. E. Nanninga*, C. L. White, Michigan Technological University, USA

5:10 PM

USAMP Project AMD307: Pan Forming of Aluminum and Magnesium

P. E. Krajewski*, General Motors Corporation, USA; P. A. Friedman, Ford Motor Company, USA; K. Oikarinen, Daimler-Chrysler, USA; D. Cedar, Troy Tooling Technologies, USA

Automotive: Automotive Light Metal Castings: Technology and Applications

Casting Process Development, Simulation, Modeling and Optimization

Room: W2-64

Session Chairs: Roderick Guthrie, McGill University; James Yurko, BuhlerPrince Inc.

2:00 PM

Introductory Remarks

2:10 PM

High Speed Strip Casting of Aluminum Sheet Material Using HSBC Technology (Invited)

R. I. Guthrie*, D. Li, M. Isac, McGill University, Canada

2:50 PM

The Role of High Pressure Die Casting in the Expanded Use of Aluminum and Magnesium for Automotive Applications (Invited)

J. Yurko*, BuhlerPrince Inc., USA

3:30 PM

Process Characterization Using In-Cavity Direct Measurement Techniques for High Pressure Die Casting Process

L. A. Godlewski*, J. W. Zindel, M. Li, B. Schneider, Ford Motor Company, USA

3:50 PM

Tool Material: A Key Factor in Die Casting of Light Alloys

I. Valls*, D. Marco, N. Rodríguez, B. Casas, Rovalma, S.A., Spain

4:10 PM

Reinforcement of Aluminum Castings with Dissimilar Metals

Q. Han*, Oak Ridge National Laboratory, USA; S. Viswanathan, University of Alabama at Tuscaloosa, USA; Y. Chen, M. R. Myers, Cummins, Inc., USA

Automotive: High-Density Hydrogen Storage for Automotive Applications: Materials and Methods

Complex Hydrides IV

Room: W2-66

Session Chair: Donald Siegel, Ford Motor Company

2:00 PM

Introductory Remarks

2:10 PM

Computational Approach to Discovery of Novel Hydrogen Storage Materials (Invited)

C. Wolverton*, Northwestern University, USA; D. Siegel, Ford Motor Company, USA; V. Ozolins, UCLA, USA

2:50 PM

Predicting Structures and Phase Diagrams of Multicomponent Hydrides from First-Principles Density Functional Calculations (Invited)

V. Ozolins*, A. Akbarzadeh, UCLA, USA; C. Wolverton, Northwestern University, USA; D. J. Siegel, Ford Motor Company, USA; E. Majzoub, Sandia National Laboratories, USA

3:30 PM

The Relation of Stability and Reversibility of Metallic Borohydrides

M. Au*, B. Spenser, A. Jurgensen, Savannah River National Lab, USA

3:50 PM

Panel Discussion – Complex Hydrides

Electronic and Magnetic Properties: Basic and Applied Needs for Superconductivity

Coated Conductors II

Room: D2-11

Session Chairs: Raghu Bhattacharya, NREL; Timothy Haugan, AFRL/PRPG

2:00 PM

Introductory Remarks

2:10 PM

Probing the Interfacial Defects in YBa₂Cu₃O_{7-δ} Thin Films (Invited)

H. Wang*, J. Yoon, R. Araujo, Texas A & M University, USA; S. R. Foltyn, Q. X. Jia, B. Maiorov, H. Zhou, L. Civale, Los Alamos National Laboratory, USA; J. L. MacManus-Driscoll, University of Cambridge, United Kingdom; X. Zhang, Texas A & M University, USA

2:50 PM

Influence of Nucleation and Growth of YBCO Superconductor on Microstructure and Properties in Coated Conductor (Invited)

D. Miller*, R. Arenal, R. Koritala, J. Hiller, V. Maroni, Argonne National Lab, USA

3:30 PM

Critical Current Densities and the Structural Quality of 3-and 4-um-Thick Superconducting YBa₂Cu₃O₇ Layers Synthesized Using the Ex-Situ Process (Invited)

V. Solovyov*, H. Wiesmann, Brookhaven National Laboratory, USA

3:50 PM

Issues of Process Control for Solution Processed Oxide Buffer Layers for Coated Conductor Fabrication (Invited)

S. Sathyamurthy*, University of Tennessee, USA; M. Paranthaman, Oak Ridge National Laboratory, USA

4:10 PM

Understanding the Growth of LaMnO₃ by Metal-Organic Decomposition for Use as a Buffer Layer on Ni(W) Substrates (Invited)

E. Hellstrom*, K. Venkataraman, University of Wisconsin-Madison, USA; M. Rupich, X. Li, American Superconductor Corporation, USA; T. Tsuchiya, National Inst. of Advanced Industrial Science and Technology (AIST), Japan

4:30 PM

Scale-Up of Long Length YBCO/SrTiO₃/NiW All-Solution Deposited Epitaxial Coated Conductors

P. Clem*, M. P. Siegal, D. L. Overmyer, C. V. Edney, Sandia National Laboratories, USA

4:50 PM

Phase Relationships in the Ba-R-Cu-O (R=Y and Lanthanides) Films

W. Wong-Ng*, M. Otani, I. Levin, L. P. Cook, Z. Yang, P. Schenck, J. Ritter, NIST, USA; R. Feenstra, Oak Ridge National Laboratory, USA; T. Holesinger, Los Alamos National Laboratory, USA; A. Goyal, Oak Ridge National Laboratory, USA

Electronic and Magnetic Properties: Ferroelectrics and Multiferroics

Ferroelectric Materials, Characterization, and Properties

Room: D2-10

Session Chair: Dwight Viehland, Virginia Tech

2:00 PM

Introductory Remarks

2:10 PM

Electrical Property Relationships Induced by Textured Processing for Non-Lead Based Compositions

C. DiAntonio*, N. Bell, M. Rodriguez, G. Samara, P. Yang, G. Burns, T. Chavez, A. Blea, Sandia National Laboratories, USA

2:30 PM

Dielectric Relaxations and Ultrasonic Attenuation of CaCu₃Ti₄O₁₂ Giant Dielectric Constant Ceramics (Invited)

X. Chen*, L. Ni, Zhejiang University, China

3:10 PM

Thermal Depoling of Lead-Free Aurivillius Phase Ferroelectric Ceramics with High Curie Points

H. Yan*, X. Zhang, H. Zhang, M. J. Reece, Queen Mary, University of London, United Kingdom

3:30 PM

Development of Cation Order and its Impact on Dielectric Properties in Pb(Mg_{1/3}Nb_{2/3})O₃-Based Relaxor Ferroelectrics

X. Zhao*, W. Qu, X. Tan, Iowa State University, USA

3:50 PM

High Curie Temperature yBiGaO₃-(1-x-y)BiScO₃-xPbTiO₃ Piezoelectric Ceramics

J. Zhu*, Y. Jiang, B. Qin, X. Yue, D. Xiao, Sichuan University, China; Z. Xu, Xi'an Jiaotong University, China

4:10 PM

Lead-Free Sodium Potassium Niobate Piezoelectric Ceramics and Middle Frequency Resonator

J. Zhu*, Q. Chen, L. Chen, Q. Li, D. Xiao, Sichuan University, China; X. Shi, Z. Liu, Hunan Jiayeda Electronic Co., LTD, China

Electronic and Magnetic Properties: General Topics in Electroceramics

Sensor Materials and Performance

Room: D2-15

Session Chair: Robert Schwartz, University of Missouri-Rolla

2:00 PM

Introductory Remarks

2:10 PM

Metal-Oxide Nanoparticle Gas Sensor Arrays

E. R. Beach*, A. Dougherty, M. Andio, B. Patton, P. Morris, The Ohio State University, USA

2:30 PM

Sensor Properties of Conducting Polymer/Graphite Composite Structures

Y. A. Balogun*, R. C. Buchanan, University of Cincinnati, USA

2:50 PM

Electroluminescence from Grain Boundaries in ZnO Varistors

F. Greuter*, ABB Corporate Research Ltd, Switzerland

Tuesday PM

Electronic and Magnetic Properties: International Symposium on Dielectric Materials: Design, Preparation and Applications

Amorphous Dielectrics and Polymeric Materials: Applications and Processing

Room: D2-09

Session Chair: Ming-Jen Pan, US Naval Research Laboratory

2:00 PM

Introductory Remarks

2:10 PM

Processing and Properties Of Inorganic/Organic Dielectric Nanocomposites (Invited)

B. I. Lee*, L. Qi, P. Badheka, G. Devaraju, H. Maie, Clemson Univ., USA

2:30 PM

Polarization Measurements of Molded Liquid Crystal Polymer/Titania Composites

B. R. Dantal*, Tufts University, USA; K. Korolev, Extremely High Frequency Medical and Technical Association, Russian Federation; A. Saigal, M. Afsar, U. Khan, M. Zimmerman, Tufts University, USA

2:50 PM

Dysprosium-Doped TiO₂ Thin Film Prepared by Pulse Laser Deposition for Embedded Capacitor Application

C. Choi*, S. Nahm, Korea University, South Korea; J. Hong, J. Lee, Samsung Electro-Mechanics Co., South Korea

3:10 PM

Microstructure and Dielectric Properties of the Amorphous Bi_{1.5}ZnNb_{1.5}O₇ Thin Films grown on TiN/Si Substrate

K. Hong*, Y. Jeong, J. Lim, S. Nahm, Korea University, South Korea; H. Sun, Kunsan National University, South Korea; H. Lee, Korea Research Institute of Standard and Science, South Korea

3:30 - 3:50 p.m.

Break

Ferroic Materials Synthesis and Properties: A Joint Session with Electronics Division's General Session

Room: D2-09

Session Chairs: Robert Schwartz, University of Missouri-Rolla; Q. X. Jia, Los Alamos National Lab

3:50 PM

Chemical Solution Approach for the Growth of a Variety of Electronic Oxide Thin Films (Invited)

M. Jain*, F. Ronning, M. Hundley, A. K. Burrell, T. M. McCleskey, B. Majorov, L. Civale, Los Alamos National Laboratory, USA; A. S. Bhalla, The Pennsylvania State University, USA; R. S. Katiyar, The University of Puerto Rico, Puerto Rico; Q. X. Jia, Los Alamos National Laboratory, USA

4:10 PM

Dry Powder Deposition for Fabrication of Electromagnetic Devices Using Textured Dielectric and Magnetic Ceramics

S. Z. Nergiz, G. Kiziltas*, Sabanci University, Turkey

4:30 PM

Dielectric Characterization of M and W-Type Barium Hexaferrite Prepared by Multiple Sintering Techniques

P. Shepherd*, University of Nottingham, United Kingdom; K. K. Mallick, University of Warwick, United Kingdom; I. Harrison, University of Nottingham, United Kingdom

4:50 PM

Flexible Ceramics-Polymer Composites with Equivalent Permittivity and Permeability Properties for Antenna Applications

T. B. Do*, University of Michigan, USA; I. Tzanidis, S. Koulouridis, J. L. Volakis, Ohio State University, USA; J. W. Halloran, University of Michigan, USA

5:10 PM

Fabrication of Magnetic Photonic Arrays for High-Gain Antennas at GHz Frequencies

L. Zhang*, G. Mumcu, K. Sertel, J. L. Volakis, H. Verweij, The Ohio State University, USA

5:30 PM

Thermoelectric Power, Dielectric and Magnetic Properties of Sr-La M-type Hexagonal Ferrites

A. P. Singh*

Electronic and Magnetic Properties: Structure-Property Relationships of Multifunctional Oxide Thin Films and Interfaces

Charaterization and Application of Metal-oxides

Room: D2-08

Session Chairs: Q. X. Jia, Los Alamos National Lab; Yalin Lu, US Air Force Academy

2:00 PM

Introductory Remarks

2:10 PM

Influence of Interfacial Dislocations on Domain Switching of Ferroelectric Thin Films (Invited)

S. Hu, Y. Li, Los Alamos National Laboratory, USA; S. Choudhury, Penn State University, USA; M. Baskes, A. Saxena, T. Lookman, Q. Jia, Los Alamos National Laboratory, USA; D. Schlom, L. Chen*, Penn State University, USA

2:50 PM

Strongly Coupled Dielectric Superlattices and Their Photonics Applications (Invited)

Y. Lu*, US Air Force Academy, USA

3:30 PM

Atomic-Scale Characterization of Lively Dead Layers in Thin Film Oxides (Invited)

M. Chisholm*, Oak Ridge National Laboratory, USA; G. Duscher, North Carolina State University, USA; H. Lee, M. Varela, Oak Ridge National Laboratory, USA

4:10 PM

Interface Engineering in the High-K Dielectrics Gate Stacks (Invited)

S. Wang*, Institute of Materials Research & Engineering, Singapore

Energy: Energy Materials

Solar Energy Materials II

Room: D2-13

Session Chairs: Kevin Howard, The Dow Chemical Company; Dileep Singh, Argonne National Laboratory

2:00 PM

Introductory Remarks

2:10 PM

Spectral Selectivity of Thin Enamels for Solar-Thermal Conversion

H. J. Brown-Shaklee*, University of Missouri-Rolla, USA; W. M. Carty, D. D. Edwards, Alfred University, USA

2:30 PM

Microstructure Evaluation of Roll-coated, Templated Nanocrystalline TiO₂ Films for Dye-Sensitized Solar Cells

S. Phadke*, J. Stanley, D. P. Birnie, III, Rutgers University, USA

2:50 PM

Transparent Conducting Oxide Based Templated Structures For Photovoltaic Applications

S. Murali*, L. Qi, D. P. Birnie, Rutgers, The State University of New Jersey, USA

3:10 PM

Simultaneous Delivery and Solidification of a Thin Silicon Layer

H. Chen*, H. Umaphathy, P. Mohanty, B. Li, University of Michigan, USA

3:50 PM

Simulation of Multi-Nozzle Delivery System for Thin Liquid Layers

Y. Shu*, P. Mohanty, B. Li, S. Sengupta, University of Michigan, USA

4:10 PM

Evaluation of Ionic Liquids as Thermal Storage and Heat Transfer Materials

M. Zhang*, R. G. Reddy, The University of Alabama, USA

Energy: Fuel Cells: Materials, Processing, Manufacturing and Power Management Technologies

Cell Materials, Performance, Degradation, Manufacturing of High Temperature FCs III

Room: D2-14

Session Chairs: Jeffrey Fergus, Auburn University; S. Sundaram, Pacific Northwest National Lab

2:00 PM

Introductory Remarks

2:10 PM

Composite La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O₃ - Ce_{0.9}Gd_{0.1}O_{1.95} Cathodes for Solid Oxide Fuel Cells by Infiltration

M. Shah*, P. W. Voorhees, S. A. Barnett, Northwestern University, USA

2:30 PM

Modification of Solid Oxide Fuel Cell (SOFC) Anodes and its Effect on Sulfur Tolerance

L. Tang*, Y. Huang, M. R. De Guire, J. H. Payer, Case Western Reserve University, USA; Z. Liu, SOFCo-EFS Holdings LLC, USA

2:50 PM

Mechanism for SOFC Anode Degradation from Hydrogen Sulfide

A. Lussier*, S. Sofie, J. Dvorak, Y. Idzerda, Montana State University, USA

Fundamentals and Characterization: Characterization and Modeling of the Mechanical Performance of Advanced Alloys: Bridging the Data Gap

Characterization of Automotive Aluminum Alloys

Room: D0-07B

Session Chair: Manish Mehta, National Center for Manufacturing Sciences

2:00 PM

Introductory Remarks

2:10 PM

Constitutive Modeling of Flow in AA5083 Sheet during Hot Forming (Invited)

E. M. Taleff*, The University of Texas at Austin, USA; L. G. Hector, General Motors Corp., USA

2:30 PM

Mechanical Behavior of Strain Hardened Ultra-Fine Grained Al 5083

T. D. Topping*, A. P. Newbery, Z. Zhang, E. J. Lavernia, University of California, Davis, USA

2:50 PM

Microstructures for Large Elongations in Superplastic Aluminum Materials

H. Hosokawa*, National Institute of Advanced Industrial Science and Technology (AIST), Japan; K. Higashi, Osaka Prefecture University, Japan

3:10 PM

The Effect of an Intermediate Heat-Treatment on the Formability of an Aluminum Alloy during Multipass In-Plane Tension

S. Banovic*, M. Iadicola, T. Foecke, NIST, USA

3:30 PM

The Effect of Bi-Linear Strain Paths on the Tensile Yield Loci of AA 5754-O

M. A. Iadicola*, National Institute of Standards and Technology, USA

3:50 PM

Analysis of Plastically Deformed Polycrystalline Aluminum Sheet Surfaces in Three Dimensions

M. R. Stoudt*, J. B. Hubbard, National Institute of Standards and Technology, USA

4:10 PM

Heterogeneity in the Plastic Deformation of Solution Strengthened Aluminum Alloys

J. C. Mach*, A. J. Beaudoin, University of Illinois, USA

Fundamentals and Characterization: Discovery and Optimization of Materials through Computational Design

Bridging Lengthscales: Application of Multiscale Modeling to Materials Design II

Room: D0-05AB

Session Chair: Raymundo Arroyave, Texas A&M University

2:00 PM

Introductory Remarks

Tuesday PM

2:10 PM

Putting it All Together: New Connections at the Microstructural Scale (Invited)

E. A. Holm*, D. Olmsted, S. M. Foiles, Sandia National Laboratory, USA; K. G. Janssens, Paul Scherrer Institut, Switzerland; C. C. Battaile, Sandia National Laboratory, USA; W. A. Counts, Max-Planck-Institut für Eisenforschung GmbH, Germany

2:50 PM

Multi-Scale Modeling of Stress Effects on Vacancy Mediated Dopant Diffusion in Silicon (Invited)

B. Puchala*, M. L. Falk, K. Garikipati, P. Mohal, University of Michigan, USA

3:30 PM

Phase Field Crystal Modeling in Material Science (Invited)

K. R. Elder*, Oakland University, USA

4:10 PM

Framework for the Computational Design of Ti Alloys

H. L. Fraser*, The Ohio State University, USA; M. DeGraef, Carnegie-Mellon University, USA; S. Ghosh, The Ohio State University, USA; S. Kalidindi, Drexel University, USA; J. Li, Y. Wang, J. Williams, The Ohio State University, USA

Fundamentals and Characterization: Fundamentals of Brittle Fracture

Atomistics, Bonding & Scaling

Room: D0-03A

Session Chair: Robert Cook, NIST

2:00 PM

Introductory Remarks

2:10 PM

Fracture Energy of Brittle Crystals: Prediction and Experiment (Invited)

S. Freiman*, G. S. White, E. R. Fuller, NIST, USA; J. J. Mecholsky, University of Florida, USA

2:50 PM

The Nature of Brittle Fracture (Invited)

B. R. Lawn*, NIST, USA

3:50 PM

Formulation of Critical Questions for Understanding Brittle Fracture (Invited)

J. J. Mecholsky*, University of Florida, USA

4:30 PM

Roughness of Glass Surfaces Formed by Sub-Critical Crack Growth (Invited)

S. M. Wiederhorn*, National Institute of Standards and Technology, USA; J. Guin, Université de Rennes 1, France; T. Fett, Universität Karlsruhe, Germany; J. Wallace, National Institute of Standards and Technology, USA; J. M. López-Cepero, University of Seville, Spain

5:10 PM

Fracture of Glass Fibers Under Very Low Loading (Invited)

S. Rehkson*, Cleveland State University, USA

Fundamentals and Characterization: High Temperature Material Systems: Fatigue Mechanisms and Prognosis

Role of Microstructure and Environment on Fatigue of Turbine Engine Materials I

Room: D0-02AB

Session Chairs: Joseph Rigney, GE Aviation; Michael Caton, Air Force Research Lab

2:00 PM

Introductory Remarks

2:10 PM

Worst-Case Prognosis of Advanced Turbine Engine Materials (Invited)

J. M. Larsen*, Air Force Research Laboratory, USA; S. K. Jha, Universal Technology Corporation, USA; M. J. Caton, A. H. Rosenberger, R. John, Air Force Research Laboratory, USA

2:50 PM

Oxidation Assisted Damage in High Temperature Alloys and Lifetime Modelling (Invited)

L. Remy*, Ecole des Mines, Paris, France

3:30 PM

Modeling High Temperature Strain-life Relationship of Commercial Alloys

Z. Guo, N. Saunders, P. Miodownik, J. Schille*, Sente Software Ltd, United Kingdom

Fundamentals and Characterization: International Symposium on Defects, Transport and Related Phenomena

Transport III

Room: D0-03C

Session Chairs: Manfred Martin, RWTH Aachen University; Han-Il Yoo, Seoul National University

2:00 PM

Introductory Remarks

2:10 PM

Electrochemical Coloration and Oxygen Vacancy Mobility in BaTiO₃ (Invited)

H. Yoo*, M. Chang, T. Oh, Seoul National University, South Korea; K. Becker, Technische Universität Braunschweig, Germany

2:50 PM

Numerical Modeling of Grain Boundary Grooving and Pore Smoothing

D. Readey*, Y. Yeo, Colorado School of Mines, USA

3:10 PM

Gas Corrosion of MgO in HCl by Grain Boundary Grooving and Pore Smoothing

D. Readey*, Y. Yeo, Colorado School of Mines, USA

3:30 PM

Corrosion Properties of Calcium Based Bulk Metallic Glasses

J. Dahlan*, Wright Patterson Air Force Research Laboratory, USA

3:50 PM

Quantitative Prediction of Void Formation in Growing Magnetite Scale Formed on Iron at 823 K (Invited)

M. Ueda*, T. Maruyama, Tokyo Institute of Technology, Japan

Fundamentals and Characterization: Phase Stability, Diffusion and Their Applications

Phase Transformations and Coarsening

Room: D0-04ABC

Session Chairs: Zi-Kui Liu, The Pennsylvania State University; Larry Kaufman, CALPHAD, Inc

2:00 PM

Introductory Remarks

2:10 PM

Martensite, Aging, Glass Formation and Devitrification in Alloys (Invited)

L. Kaufman*, CALPHAD, Inc, USA

2:50 PM

Effect of Prior Austenite Grain Size on the Rate of Ferrite Allotriomorph Growth and Final Ferrite 1/2 Thickness in Fe-0.3C and Fe-0.3C-X Alloys

E. Damm*, The Timken Company, USA; C. J. Van Tyne, Colorado School of Mines, USA

3:10 PM

Mechanism and Kinetics of Clustering in Naturally-Aged Al-Mg-Si Alloys

H. Seyedrezaei*, H. S. Zurob, McMaster University, Canada

3:50 PM

Effect of Silver on the Precipitation of Aluminum-Magnesium-Silicon Alloy

K. Matsuda*, J. Nakamura, T. Kawabata, University of Toyama, Japan; T. Sato, Tokyo Institute of Technology, Japan; S. Ikeno, University of Toyama, Japan

4:10 PM

A Computational Tool for Precipitation Kinetics during Heat Treatments

K. Wu*, F. Zhang, S. Chen, W. Cao, Y. Yang, CompuTherm LLC, USA; Y. Chang, University of Wisconsin-Madison, USA

4:30 PM

Modelling of the Evolution of Dispersed Phase Distributions

J. Jeppsson*, H. Larsson, KTH, Sweden

4:50 PM

Coarsening Kinetics with Large Difference in Diffusional Mobilities of Two Phases

G. Sheng*, Z. Liu, L. Chen, The Pennsylvania State University, USA

5:10 PM

Mean-field Theory of Multicomponent Phase Coarsening

K. Wang*, Florida Institute of Technology, USA

Fundamentals and Characterization: What We can Learn from Failure Analysis

Fatigue & Fracture II

Room: D0-01A

Session Chairs: Michael Stevenson, MME; Dustin Turnquist, Engineering Systems Incorporated

2:00 PM

Introductory Remarks

2:10 PM

Cost-Effective Permanent Solutions to HVAC Fan Rotor and Structure Fatigue Failures

R. H. Badgley*, Emcon Systems, USA

2:30 PM

Jet Engine High Temperature Thermal Fatigue Failure (Invited)

R. J. Parrington*, IMR Test Labs, USA

3:10 PM

Failure Analysis of a Outlet Shutoff Valve and Subsequent Hazardous Materials Release (Invited)

M. E. Stevenson*, M. Hayes, M. Barkey, J. McDougall, MME, USA

3:50 PM

Fatigue Fracture of an Inertia Welded Drill Pipe (Invited)

R. P. Allwin*, T. A. Jur, Engineering Design & Testing Corp., USA

Materials and Systems: Coatings as an Enabler of System Performance

Environmental Barrier Coatings/Erosion II

Room: O2-38

Session Chairs: Rodney Trice, Purdue University; Dongming Zhu, NASA Glenn Research Center

2:00 PM

Introductory Remarks

2:10 PM

The Potential of Zirconates in Inhibiting TBC Degradation by CMAS

S. Kraemer*, R. Leckie, C. G. Levi, University of California Santa Barbara, USA

2:30 PM

High-Heat-Flux Cyclic Durability of Thermal and Environmental Barrier Coatings

D. Zhu*, L. L. Ghosn, R. A. Miller, NASA Glenn Research Center, USA

2:50 PM

Corrosion/Erosion Resistance of Ceramic Oxide Coatings Against CF₄ + O₂ Plasma

K. Baik*, Y. Lee, Chungnam National University, South Korea; H. Seok, Korea Institute of Science and Technology, South Korea

3:10 PM

Revolutionary UV-Cured, Nanotechnology Thin Film Coatings with Superior Barrier Properties

T. Krotine*, Ecology Coatings, USA

3:30 PM

Oil-Production Equipment Component Hardening with the Help of the Thermochemical Treatment

V. Artemyev*, A. Sokolov, E. Sokolov, A. Chalov, Kuban State Technological University, Russian Federation

3:50 PM

An Investigation of Grain Size of Anatase Coat on 316L Deposited by the Sol-Gel Method

H. Ghasemi*, Sharif University of Technology, Iran

Materials and Systems: Commonality of Phenomena in Composite Materials

Fiber Reinforced Composites II

Room: O2-37

Session Chairs: John Lewandowski, Case Western Reserve University; K. Chawla, University of Alabama

2:00 PM

Introductory Remarks

2:10 PM

Intrinsic and Extrinsic Approaches to Plasticity/Toughness of Bulk Metallic Glasses (Invited)

J. Lewandowski*, Case Western Reserve University, USA

2:50 PM

Manufacturing and Structural Characterization of Thermoplastic Composite Structural Insulated Panels (CSIPs)

A. S. Vaidya*, N. Uddin, U. Vaidya, University of Alabama at Birmingham, USA

3:10 PM

Study for Deformability of Layered Solids under Plane-Strain Condition

M. Serror*, J. Inoue, T. Koseki, University of Tokyo, Japan

3:30 PM

Smart Reinforcement Mechanisms in Composite Solders (Invited)

B. Ye, L. Yang, B. S. Majumdar*, New Mexico Tech, USA; I. Dutta, Naval Postgraduate School, USA

Materials and Systems: International Symposium on Ceramic Matrix Composites

Mechanical Properties

Room: O2-43

Session Chair: Sung Choi, Naval Air Systems Command

2:00 PM

Introductory Remarks

2:10 PM

Commonality of Life Limiting Behavior in Ceramic Matrix Composites and Advanced Ceramics at Elevated Temperatures (Invited)

S. R. Choi*, Naval Air Systems Command, USA

2:50 PM

Characterization of Foreign Object Damage of a SiC/SiC Composite at Room and Elevated Temperatures

D. J. Alexander*, R. W. Kowalik, S. R. Choi, Naval Air Systems Command, USA

3:10 PM

Densification and Mechanical Properties of TaC with Refractory Boride Additions

X. Zhang, G. Hilmas*, W. Fahrenholtz, University of Missouri-Rolla, USA

3:30 PM

Effect of Boron Carbide and Carbon Additions on the Densification and High Temperature Strength of Zirconium Diboride Ceramics

S. Zhu*, W. G. Fahrenholtz, G. E. Hilmas, University of Missouri-Rolla, USA

3:50 PM

Toughening of Ceramics by an in situ Polymerized Second Phase

C. H. Hsiung*, K. T. Faber, K. R. Shull, Northwestern University, USA

4:10 PM

Fracture Properties of Functionally-Graded Fiber-Reinforced Cement Composite

B. Shen, M. Fadden, L. J. Struble*, G. H. Paulino, University of Illinois at Urbana-Champaign, USA

Materials and Systems: Iron-Based Amorphous Metals: An Important Family of High-Performance Corrosion-Resistant Materials

Corrosion Resistance II

Room: O2-40

Session Chair: Raul Rebak, Lawrence Livermore National Laboratory

2:00 PM

Introductory Remarks

2:10 PM

Cyclic and Linear Polarization of Yttrium-Containing Iron-Based Amorphous Metal Drop Cast Ingots in High-Chloride and Multi-Ionic Salt Solutions: Fe₄₈Cr₁₅Mo₁₄Y₂C₁₅B₆

T. Lian*, S. D. Day, P. D. Hailey, J. Choi, J. C. Farmer, Lawrence Livermore National Laboratory, USA

2:30 PM

Long-term Corrosion Testing of Thermal Spray Coatings of Amorphous Metals

Fe_{49.7}Cr_{17.7}Mn_{1.9}Mo_{7.4}W_{1.6}B_{15.2}C_{3.8}Si_{2.4} and Fe₄₈Mo₁₄Cr₁₅Y₂C₁₅B₆

J. C. Farmer*, S. D. Day, T. Lian, P. D. Hailey, J. Choi, Lawrence Livermore National Laboratory, USA

2:50 PM

Corrosion Resistance of High-Boron High-Molybdenum Iron-Based Amorphous Metal Fe₄₈Cr₁₅Mo₁₄Y₂B₂₁ for Spent Nuclear Fuel Criticality Control Application

S. D. Day*, T. Lian, P. D. Hailey, J. Choi, J. C. Farmer, Lawrence Livermore National Laboratory, USA

3:10 PM

Crevice Corrosion of Thermal Spray Coatings of Fe-Based Amorphous Metals with Electrochemical and Surface Analytical Techniques: Fe_{49.7}Cr_{17.7}Mn_{1.9}Mo_{7.4}W_{1.6}B_{15.2}C_{3.8}Si_{2.4}

S. D. Day*, T. Lian, P. D. Hailey, J. Choi, J. C. Farmer, Lawrence Livermore National Laboratory, USA

Corrosion Resistance III

Room: O2-40

Session Chair: Joe Payer, Case Western Reserve University

3:50 PM

Comparative In Situ Investigation of Passivation and of the Passive Films Formed on Alloy C22, an Amorphous Fe-Cr Alloy and Chromium in Aqueous Electrolytes at Room Temperature and at 90°C (Invited)

T. Cohen-Hyams, S. Harrington, M. Miyagusuku, T. M. Devine*, University of California, USA

4:30 PM

Comparative Dissolution Modes of Iron-Based Amorphous Alloys and Other Corrosion Resistant Polycrystalline Materials
R. B. Rebak*, P. D. Hailey, D. Day, J. C. Farmer, Lawrence Livermore National Laboratory, USA

4:50 PM

Corrosion and Wear Resistant Amorphous and Nanocomposite Coatings
O. Racek*, B. M. Beardsley, Caterpillar, Inc., USA

5:10 PM

Methods to Examine Corrosion Damage Evolution for Fe-Based Amorphous Alloys
P. Pharkya*, X. Shan, J. Payer, Case Western Reserve University, USA

Materials and Systems: Next Generation Biomaterials: Advanced Processing, Characterization and Modeling of Materials for Medical Devices

Biomaterial Surfaces and Imaging

Room: O2-39

Session Chairs: John Nychka, University of Kentucky; Elizabeth Perepezko, BIOMET Manufacturing Corporation

2:00 PM

Introductory Remarks

2:10 PM

Protein-Surface Interactions: Role in Biocompatibility (Invited)
J. L. Brash*, McMaster University, Canada

2:50 PM

Protein Crystallization on Porous Glass Substrates
M. M. Hall*, W. LaCourse, J. Bhattacharyya, Alfred University, USA

3:10 PM

AFM Studies of Reducible Biological and Synthetic Polymers for Gene Therapy Applications
J. Blacklock*, G. Mao, Wayne State University, USA

3:30 PM

Inorganic Liquid Crystal for Biomedical Imaging
O. C. Wilson*, Catholic University, USA; A. Agrawal, Food and Drug Administration, USA

3:50 PM

Application of Rare-Earth Doped Ceramic Nanophosphors for Bioimaging under NIR Excitation
K. Soga*, Y. Saito, K. Shimizu, Y. Okumura, T. Konishi, Tokyo Univ. of Science, Japan

4:10 PM

Effect of pH on the Carbonate Incorporation into the Hydroxyapatite Prepared by an Oxidative Decomposition of Calcium-EDTA Chelates
Y. Yusufoglu*, M. Akinc, Iowa State University, USA

Nanotechnology: Materials Characterization at the Nanoscale: Instrumentation and Applications

Chemical Characterization

Room: W2-61

Session Chair: Terrence Jach, National Institute of Standards and Technology

2:00 PM

Introductory Remarks

2:10 PM

Chemical Sample Characterization on the Nanoscale: Imaging XPS and Scanning Auger Microscopy with Ultimate Spatial Resolution (Invited)

W. Gerace*, T. Berghaus, M. Maier, M. Oertel, D. Funnemann, K. Winkler, Omicron NanoTechnology, Germany; N. Barrett, CEA Saclay, France; O. Renault, CEA Leti, France

2:50 PM

Investigation of Multilayer Boride Coatings by Microdiffraction and Microfluorescence Techniques

N. Suwattananont*, R. Petrova, New Jersey Institute of Technology, USA; Z. Cai, Argonne National Laboratory, USA

3:10 PM

Atomic-scale Characterisation and Analysis Using Advanced S/TEM

D. Stokes*, B. Freitag, D. Hubert, FEI Company, Netherlands

3:30 PM

Growth and Coarsening Kinetics of Nanoscale Cu-rich Precipitates in a Multicomponent Fe-Cu Based Steel

P. Kollit*, D. N. Seidman, Northwestern University, USA

3:50 PM

X-ray Microcalorimeter: New Analysis Capability for Nanoscale Materials (Invited)

T. Jach*, N. Ritchie, J. Ulom, National Institute of Standards and Technology, USA

Nanotechnology: Nano-Processing - Property Enhancement by Quantum Confinement and Other Effects in Reduced Dimensions

Property Enhancement in Reduced Dimensions II

Room: W2-58

Session Chair: Bipradas Dutta, Catholic University

2:00 PM

Introductory Remarks

2:10 PM

Properties of Calcium Cobaltite Films

J. Battogtokh*, S. Annamalai, I. L. Pegg, B. Dutta, The Catholic University of America, USA; M. Otani, N. Lowhorn, P. Schenck, W. Wong-Ng, M. Green, National Institute of Standards and Technology, USA

2:30 PM

Investigation of Luminescence in Europium doped Zirconia

J. Ovenstone*, Alfred University, USA; J. Silver, University of Greenwich, United Kingdom

Tuesday PM

2:50 PM

Spinning of Polymer Nano-Composite

M. M. El-Ashry*, K. M. Gouda, The British University in Egypt, Egypt

3:10 PM

NSTT-NanoTech Surface Treatment Technology May Revolutionize The Steel Industry's Rolling Mill Operations

S. Ghosh*, NanoTech Metallurgy, Inc., USA

Nanotechnology: Nanostructured Ceramic Materials: Science and Technology

Industrial Development and Applications

Room: W2-67

Session Chair: Michael Hu, Oak Ridge National Laboratory

2:00 PM

Introductory Remarks

2:10 PM

Structural Control of Functional Ceramics on Nanoscale (Invited)

T. Tani*, Toyota Central R&D Labs. Inc., Japan

2:50 PM

Challenges of Nanoceramics Development for Industrial Applications (Invited)

J. Ruud*, GE Global Research, USA

3:30 PM

Sub-micron Grained Transparent Yttria-based Optical Composite Ceramics

T. Stefanik, Raytheon Integrated Defense Systems, USA; J. McCloy*, Raytheon Missile Systems, USA; R. Gentilman, Raytheon Integrated Defense Systems, USA

3:50 PM

Surface Characterization of SiC Nano-Particles and Their Stability in Aqueous Solutions

A. K. Bakshi*, Saint-Gobain, USA

4:10 PM

Preparation and Characterization of Oil-Based Nanofluids for a High-Voltage Transformer Cooling

J. Oh*, C. Choi, H. Yoo, Korea Electric Power Research Institute, South Korea

Nanotechnology: Mechanics of Nanomaterials and Micro/Nanodevices - Experimental and Modeling

Mechanics of Nanomaterials and Micro/Nanodevices-IV

Room: W2-68

Session Chairs: Jun Lou, Rice University; Norm Gitis, CETR

2:00 PM

Introductory Remarks

2:10 PM

Novel Issues in Modelling of Carbon Nanomaterials

R. Scipioni*, NIMS, Japan

2:30 PM

Parametric Atomistic Analyses of Small-Scale Metal Plasticity

R. McEntire, Y. Shen*, University of New Mexico, USA

2:50 PM

Atomistic Simulation of Mechanical Behavior of Single Crystal Copper Undergoing Both Monotonic and Cyclic Loading with Respect to Its Crystallographic Direction

S. Koh*, Georgia Institute of Technology, USA; P. R. Selvam, A. Saxena, University of Arkansas, USA; R. Tummala, Georgia Institute of Technology, USA

3:10 PM

Mechanical Behavior of Aluminum-Silicon Interfaces (Invited)

Y. Qi*, GM R&D Center, USA

3:50 PM

Role of Grain Boundaries and Surfaces on the Plasticity of Metals Specifically in Small Dimensions (Invited)

A. Ghosh*, University of Michigan, USA

Processing and Product Manufacturing: Advances in Cement-Based Materials: Manufacturing, Hydration, Admixture Interaction, Properties/Characterization, Modeling and Degradation/Durability

Advanced and Novel Methods for Characterization of Cements and Cement Manufacturing

Room: O2-36

Session Chair: Barzin Mobasher, Arizona State University

2:00 PM

Introductory Remarks

2:10 PM

Stability and Elastic Properties of Tobermorite, a Model of Cement Hydrate at the Nano-scale (Invited)

R. J. Pellenq*, CNRS, France; H. Van Damme, ESPCI, France

2:30 PM

Mineralogy, Chemistry and Dilatometer Test Method to Investigate Alkali-Silica Reaction Potential of Aggregate

A. K. Mukhopadhyay*, D. Zollinger, Texas A&M University, USA

2:50 PM

Assessing Fluid Transport in Cementitious Materials using X-ray Absorption

G. Sant*, A. Radlinska, F. Rajabipour, Purdue University, USA; P. Lura, European Patent Office, Germany; J. Weiss, Purdue University, USA

3:10 PM

Laboratory investigation of the Quick Chemical Test for Alkali-Silica Reaction

L. Ai, L. J. Struble*, R. J. Kirkpatrick, University of Illinois at Urbana-Champaign, USA

3:30 - 3:50 p.m.

Break

3:50 PM

Microstructural Changes of C-S-H Due to Drying as Observed in ESEM

P. C. Fonseca*, J. J. Thomas, H. M. Jennings, Northwestern University, USA

4:10 PM

Synergistic Method for Identification and Quantification of Crystalline and Amorphous Mineral Phases in a Class F Fly Ash

R. Chancey*, University of Texas at Austin, USA; P. Stutzman, National Institute of Standards and Technology, USA; M. Juenger, K. Folliard, D. Fowler, University of Texas at Austin, USA

Processing and Product Manufacturing: Environmental Degradation of Nonmetallic Materials and Sensors

Environmental Degradation of Non-Metallic Materials

Room: O2-41

Session Chair: Raul Rebak, Lawrence Livermore National
Laboratory

2:00 PM

Introductory Remarks

2:10 PM

**Applying Electrochemical Impedance Spectroscopy (EIS) for
Monitoring Aerospace Lubricant Conditions**

B. M. Marx*, D. P. Butt, W. B. Knowlton, L. Matthew, Boise State University, USA; H. Chin, C.
Genay, W. Ogden, Pratt and Whitney, USA; R. Yungk, Air BP Lubricants, USA

2:30 PM

**Thermodynamics and Kinetics Studies of the Corrosion of Ca-
Fe-phosphate Glasses in High pH Simulated Cement Solution**

L. Zhang*, J. Shi, R. K. Brow, University of Missouri-Rolla, USA

2:50 PM

**Development of Ceramic Sensors for On-Line Monitoring of
Actinide Concentrations in Molten Salt Electrolytes**

J. Jue*, S. X. Li, S. M. Frank, Idaho National Laboratory, USA

3:10 PM

**Theoretical Analysis for the Motion and Temperature of Melt
Droplets in Spray Degassing Process**

R. Wu*, B. Sun, D. Shu, J. Wang, Harbin Engineering University, China

Processing and Product Manufacturing: Innovative Processing and Synthesis of Ceramics, Glasses and Composites

Reaction Mechanisms and Kinetics of Processes

Room: O2-33

Session Chair: Yigal Blum, SRI International

2:00 PM

Introductory Remarks

2:10 PM

**Some Aspects of Practical Rapid Heating Cycles for Binder
Removal**

S. J. Lombardo*, J. Yun, University of Missouri, USA

2:30 PM

**Change in the Coordination Number Distribution during Powder
Compaction by Cyclic CIP**

K. Yasuda*, F. Takase, Y. Matsuo, T. Shiota, Tokyo Institute of Technology, Japan

2:50 PM

Patterned Microstructures in Polycrystalline BaTiO₃

M. Ugorek*, G. Messing, S. Trolier-McKinstry, Pennsylvania State University, USA

3:10 PM

**Chemically-Aided Approaches for Low-Temperature
Pressureless Processing of MB₂/SiC and Related UHTC
Composites**

Y. Blum*, SRI International, USA

3:30 PM

Glass Melts as Indicators for Liquid Phase Sintering in Alumina

T. F. Lam*, K. J. DeCarlo, W. M. Carty, Alfred University, USA

3:50 PM

**Preventing Solids Flow and Segregation Problems During
Precision Material Manufacturing Operations**

R. A. Barnum*, Jenike & Johanson, Inc., USA

Processing and Product Manufacturing: Joining of Advanced and Specialty Materials IX

Welding Metallurgy and Failure Analysis

Room: O2-35

Session Chairs: Sindo Kou, University of Wisconsin; Matthew
Perricone, RJ Lee Group, Inc.

2:00 PM

Introductory Remarks

2:10 PM

Issues in Joining Corrosion-Resistant Alloys (Invited)

J. F. Grubb*, ATI Allegheny Ludlum, USA

2:50 PM

**How Macroseggregation Occurs in Welds Made with a Dissimilar
Filler Metal**

S. Kou*, Y. Yang, University of Wisconsin, USA

3:10 PM

**Characterization of the HAZ and Recast Microstructures in
Laser Drilled Superalloys**

J. K. McGuinness, R. Bright, M. Aindow*, H. Marcus, University of Connecticut, USA

3:30 PM

**Liquation Cracking in Heat Affected Zone in Nickel Superalloy
Welds**

M. C. Chaturvedi*, University of Manitoba, Canada

3:50 PM

**Evidence of Macroseggregation in Welds Made with a Dissimilar
Filler Metal**

Y. Yang, S. Kou*, University of Wisconsin, USA

4:10 PM

**Determining the Critical Cooling Rate for the Massive
Transformation from Ferrite to Austenite in Laser Welded Mo-
Bearing Stainless Steels**

M. J. Perricone*, C. V. Robino, M. Reece, P. S. Duran, D. O. MacCallum, Sandia National
Laboratories, USA

4:30 PM

**The Influence of Gd and B on the Solidification and Weldability
of a Ni-Cr-Mo Alloy**

J. N. DuPont*, Lehigh University, USA; C. V. Robino, Sandia National Laboratory, USA; T. D.
Anderson, Lehigh University, USA

4:50 PM

Fatigue Failure in Fusion Welds in AA6082 Extrusions

K. M. Becker*, C. L. White, N. E. Nanninga, Michigan Technological University, USA

5:10 PM

**Homogeneity of Wear Resistant MMC Coatings Deposited by
Plasma Transferred Arc Welding**

T. Wolfe*, H. Henein, University of Alberta, Canada; S. Chiovelli, Syncrude Canada Ltd.,
Canada

Tuesday PM



The Profound Influence of Tony Evans on Engineering Use of Structural Materials

Processing and Fracture of Composites

Room: M2-29

Session Chair: Frederick Lange, University of California, Santa Barbara

2:00 PM

Introductory Remarks

2:10 PM

High Temperature Composites for Aerospace (Invited)

D. B. Marshall*, B. Cox, O. Sudre, J. Davis, Teledyne Scientific, USA

2:50 PM

Polycrystalline Ceramic Composites with Large Residual Stresses (Invited)

E. R. Fuller*, A. T. Durnford, Natl. Inst. of Stds. & Tech., USA; I. E. Reimanis, C. Seick, K. Fitzpatrick, Colorado School of Mines, USA

3:30 PM

Spontaneous Ejecta in Low Thermal Expansion Composites (Invited)

I. Reimanis*, Colorado School of Mines, USA; E. Fuller, A. Durnford, National Institute of Standards and Technology, USA; U. Ramamurty, S. Kailas, Indian Institute of Science, India

4:10 PM

Lateral Epitaxial Overgrowth of ZnO in Water at 90C (Invited)

F. F. Lange*, S. Fillery, D. R. Clarke, J. Richardson, University of California, Santa Barbara, USA; J. Kim, Chonnam Nat. Univ, South Korea

Steel: Future of Alloying in Steel

Future of Alloying in Steel

Room: W2-70

Session Chair: Chris Schade, Hoeganaes Corporation

2:00 PM

Introductory Remarks

2:10 PM

Multicomponent High-Strength Low-Carbon Ferritic Steel with Nanosize Precipitates

P. Kolli*, S. Vaynman, D. Isheim, M. E. Fine, D. N. Seidman, Northwestern University, USA

2:30 PM

Graphical Expressions of Alloying Effects in Fe and Their Analogical Applications

Y. Mae*, Maetech, Japan

2:50 PM

Effect of Aluminum on Isothermal Oxidation Resistance of Austenitic Heat Resistant Steels

M. O. Aminian*, Delta Advanced Ceramic Co., Iran

3:10 PM

Effect of Carbon on Isothermal Oxidation Resistance of Austenitic Heat Resistant Steels

M. O. Aminian*, Delta Advanced Ceramic Co., Iran

3:30 - 3:50 p.m.

Break

3:50 PM

Research of Properties of Zinc Coverings Received in Self-Propagating High-Temperature Synthesis Conditions

B. P. Sereda*, Zaporizhzhian State Engineering Academy, Ukraine

Steel: Steel Product Metallurgy and Applications

Microstructure and Heat Treatment

Room: W2-69

Session Chair: Mark Blankenau, Severstal, NA

2:00 PM

Introductory Remarks

2:10 PM

Effect of Prior Microstructure and Heating Rate on Austenite Formation in Three Steels

K. D. Clarke*, C. J. Van Tyne, Colorado School of Mines, USA

2:30 PM

The Induction Hardening Response of Ferrite and Pearlite Banded 4145 Steel

P. Anderson*, The Timken Company, USA; D. K. Matlock, J. G. Speer, Colorado School of Mines, USA

2:50 PM

Effect of Tempering on the Microstructure and Properties of Copper and Boron Bearing Very Low Carbon Steels Treated with DQ/T

S. Jiao, Baosteel, China; X. Liang, University of Pittsburgh, USA; C. Wang, L. Jin, Baosteel, China; Y. Gong*, University of Pittsburgh, USA

3:10 PM

Properties of Bainite Nucleated by Water Quenching in 80ms

G. M. Cola*, SFP Works, LLC, USA

3:30 PM

Bainitic Transformation in Carburized 4317 M2

S. Chupatanakul*, P. Nash, D. Chen, Illinois Institute of Technology, USA

3:50 PM

A Potential Graphitisation Route to Improved Machinability of Carbon Steels

D. V. Edmonds*, K. He, University of Leeds, United Kingdom

4:10 PM

Multi-Stage Continuous Furnace Innovation in Stress Relieving Duramax Engine Blocks

E. Lackner*, Alfe Heat Treating, USA

Tuesday PM