SYMPOSIUM 2: Advanced Ceramic Coatings for Structural, Environmental, and Functional Applications

Wednesday, January 29, 2014

Advanced Thermal Barrier Coatings: Failure Mechanisms and Process Modeling

8:00 AM-12:00 PM
Room: Coquina Salon G
Session Chair(s): TBA

8:00 AM
(ICACC-S2-001-2014) Attack of Thermal Barrier Coatings in Gas-Turbine Engines by Molten Silicate Deposits (Sand, Ash) and its Mitigation (Invited Speaker)
Nitin P Padture*, Brown University, USA

8:30 AM
(ICACC-S2-002-2014) Thermal stability and CMAS resistance of ZrO2-Y2O3 and Gd2Zr2O7 thermal barrier coatings deposited by a novel low power plasma process (Invited Speaker)
Frédéric Rousseau*, Ecole Nationale Supérieure de Chimie de Paris, France; Odile Lavigne, Marie Hélène Vidal-Sétif, ONERA, France; Daniel Morvan, Ecole Nationale Supérieure de Chimie de Paris, France

9:00 AM
(ICACC-S2-003-2014) Solubility of oxides from ZrO2-Y2O3 and ZrO2-Nd2O3 systems in a molten CAS: Selection of a thermal barrier composition resistant to CAS infiltration
Marie-Helene Vidal-Setif*, Nezha Chellah, Catherine Rio, Odile Lavigne, ONERA, France;

Michel Vilasi, Christophe Rapin, Carine Petitjean, Pierre-Jean Panteix, Institut Jean Lamour, France

9:20 AM
(ICACC-S2-004-2014) Limitations of Rare Earth Reactive Crystallization for CMAS Mitigation in T/EBCs
David Lars Poerschke*, Carlos G Levi, University of California Santa Barbara, USA

9:40 AM
Break

10:00 AM
(ICACC-S2-005-2014) Advanced thermal spray methods for thermal barrier coatings (Invited Speaker)
Robert Vassen*, Nadine Schlegel, Stefan Rezanka, Georg Mauer, Daniel Mack, Forschungszentrum Jülich GmbH, Germany

10:30 AM
(ICACC-S2-006-2014) Emerging Issues in Hot-Section Materials Development for Gas Turbine Systems and Use of Alternative Fuels (Invited Speaker)
Matthew H Sullivan, Timothy J Montalbano, Joseph P Horwath, Daniel R Mumm*, University of California, Irvine, USA

11:00 AM
(ICACC-S2-007-2014) Solid particle erosion of TBCs: jet tester modelling and erosion forecasts
Federico Cernuschi*, Lillo Augello, RSE, Italy

11:20 AM
(ICACC-S2-008-2014) Lifetime Modeling of Plasma Sprayed Thermal Barrier Coatings
Christian Nordhorn*, Robert Muecke, Robert Vassen, Forschungszentrum Juelich GmbH, Germany

11:40 AM
(ICACC-S2-009-2014) Investigation of bond coat rumpling under the TBC and on a bare bond coat using computed X-ray tomography and 3D SEM-
Photogrammetry
Sina Shahbazmohamadi*, Navid Asadizanjani, Eric H Jordan, University of Connecticut, USA

Advanced Thermal Barrier Coatings: New Compositions, Processing, Testing Development I
1:30 PM-5:50 PM
Room: Coquina Salon G
Session Chair(s): TBA

1:30 PM
(ICACC-S2-010-2014) Processing and Properties of Yttrium Aluminum Garnet Thermal Barrier Coatings Made By the Solution Precursor Plasma Spray Process (Invited Speaker)
Maurice Gell*, Eric Jordan, Jeffrey Roth, Chen Jiang, University of Connecticut, USA; Balky Nair, Jiwen Wang, HiFunda LLC, USA

2:00 PM
(ICACC-S2-011-2014) Performance of advanced thermal barrier coating systems in a thermal gradient test rig
Robert Vassen*, Vadym Kochubey, Forschungszentrum Jülich GmbH, Germany; Tanja Wobst, Rolls-Royce Deutschland LtdCo, Germany; Ben Rittmeister, GfE Fremat GmbH, Germany; Frank Brückner, Fraunhofer IWS, Germany

2:20 PM
(ICACC-S2-012-2014) The influence of process parameters on the microstructure evolution of ZrO2-CeO2-TiO2 thermal barrier coatings
Chandra Macauley*, University of California Santa Barbara, USA; Don Lipkin, GE Global Research, USA; Sanjay Sampath, Stony Brook University, USA; Carlos Levi, University of California Santa Barbara, USA

2:40 PM
(ICACC-S2-013-2014) Thermal Conductivity and

Phase Stability in the Y2O3-Ta2O5-ZrO2 System
Samuel Shian*, Andi M Limarga, Harvard University, USA; Rafael M Leckie, Carlos G Levi, University of California, USA; David R Clarke, Harvard University, USA

3:00 PM
Break

3:20 PM
(ICACC-S2-014-2014) Performance and Stability of Unique Multiphase Thermal Barrier Coatings (TBCs) (Invited Speaker)
Douglas E Wolfe*, Michael P Schmitt, The Pennsylvania State University, USA; Amarendra K Rai, UES Inc, USA; Rabi Bhattacharya, Dongming Zhu, NASA Glenn Research Center, USA

3:50 PM
(ICACC-S2-015-2014) Optimum wavy multilayer structure for high efficiency thermal radiation energy reflection coatings
Masahiro Yamazoe*, Hideki Kakisawa, Yutaka Kagawa, University of Tokyo, Japan; Satoshi Kitaoka, Makoto Tanaka, Japan Fine Ceramics Center, Japan

4:10 PM
(ICACC-S2-016-2014) Temperature Measurements of Thermal Barrier Coating Surfaces Using a Cr-Doped GdAlO₃ Thermographic Phosphor
Jeffrey I Eldridge*, Timothy J Bencic, Dongming Zhu, NASA Glenn Research Center, USA; Michael D Cuy, Vantage Partners, USA; Douglas E Wolfe, Penn State University, USA; Thomas P Jenkins, MetroLaser, Inc., USA; Stephen W Allison, David L Beshears, Emerging Measurements, USA; Bauke Heeg, Lumium, Netherlands

4:30 PM
(ICACC-S2-017-2014) Stress in NiCoCrAlY Bond Coat Induced by Phase Transformation
Ying Chen*, University of Manchester, United Kingdom; Xiaofeng Zhao, Shanghai Jiao Tong University, China; Ping Xiao, University of Manchester, United Kingdom; Nicholas Curry,
Nicolae Markocsan, Per Nylen, University West, Sweden

4:50 PM
(ICACC-S2-018-2014) Contribution of in situ high temperature Raman spectroscopy to the fundamental understanding of CAS/8YPSZ interaction
Samuel Margueron*, Solène Ropers, University of Lorraine, France; Marie-Hélène Vidal-Sétif, Catherine Rio, Odile Lavigne, Onera, The French Aerospace Lab, France

5:10 PM
(ICACC-S2-019-2014) Effects of deposition rate and temperature gradient on the damage mechanisms of thermal barrier coatings subjected to corrosion by glassy deposits
Alan Harris*, Eric Jordan, University of Connecticut, USA

5:30 PM
(ICACC-S2-020-2014) In situ measurement of modulus of elasticity for 7 wt. % YSZ Electron Beam-Physical Vapor Deposition Thermal Barrier Coating for small strains
Shayan Ahmadian*, Eric H Jordan, University of Connecticut, USA

Thursday, January 30, 2014
Advanced Thermal and Environmental Barrier Coatings

8:00 AM-12:20 PM
Room: Coquina Salon G
Session Chair(s): TBA

8:00 AM
(ICACC-S2-021-2014) Hot gas corrosion and EBC development for ceramic materials (Invited Speaker)
Hagen Klemm*, Willy Kunz, Alexander Michaelis, FhG IKTS Dresden, Germany

8:30 AM
(ICACC-S2-022-2014) The structure design for the impact resistance of environmental barrier coatings (Invited Speaker)
Yiguang Wang*, Jia Liu, Northwestern Polytechnical University, China

9:00 AM
(ICACC-S2-023-2014) Effect of periodical stress/strain distribution on fracture behavior of EBCs coated on woven continuous fiber-ceramic matrix composites
Yuichi Motoyama*, Hideki Kakisawa, Yutaka Kagawa, The University of Tokyo, Japan

9:20 AM
(ICACC-S2-024-2014) Stress Relaxation in an Air Plasma Sprayed Silicate Coating
Julin Wan*, Eleanor Gamble, Don Lipkin, Curtis Johnson, GE Global Research, USA

9:40 AM
Break

10:00 AM
(ICACC-S2-025-2014) Oxygen and water vapor permeability of Y2Ti2O7 at high temperatures
Makoto Tanaka*, Tsuneaki Matsudaira, Japan Fine Ceramics Center, Japan; Hayato Mukai, Takuma Sassa, Gifu University, Japan; Satoshi Kitaoka, Japan Fine Ceramics Center, Japan; Michiyuki Yoshida, Osamu Sakurada, Gifu University, Japan

10:20 AM
(ICACC-S2-026-2014) APS Y2O3 Environmental Barrier Coatings with high CMAS-Resistance
Peter Mechnich*, Wolfgang Braue, German Aerospace Center (DLR), Germany

10:40 AM
(ICACC-S2-027-2014) Deposition parameter-microstructure study of ytterbium silicate based EBCs deposited via APS
Bradley T Richards*, Hengbei Zhao, Haydn N.G. Wadley, University of Virginia, USA
11:00 AM
(ICACC-S2-028-2014) High Temperature Multilayer Environmental Barrier Coatings Deposited Via Plasma Spray-Physical Vapor Deposition
Bryan Harder*, Dongming Zhu, NASA Glenn Research Center, USA; Michael P Schmitt, Douglas E Wolfe, Pennsylvania State University, USA

11:20 AM
(ICACC-S2-029-2014) Characterization of Desert Sand and Glass
Narottam Bansal*, NASA Glenn Research Center, USA; Sung R Choi, Naval Air Systems Command, USA

11:40 AM
(ICACC-S2-030-2014) Interactions of Desert Sand Glass with Advanced Y₂Si₂O₇ and HfSiO₄ Environmental Barrier Coatings
Valerie L Wiesner*, Bryan J Harder, Narottam P Bansal, NASA Glenn Research Center, USA

12:00 PM
(ICACC-S2-031-2014) The Influence of Ca-Mg-Al Silicates on Stresses, Phase Transformations, and Damage Evolution in Yb-Silicate Environmental Barrier Coatings
Fabian Stolzenburg*, Northwestern University, USA; Peter Kenesei, Jon Almer, Argonne National Lab, USA; Kang N Lee, Rolls-Royce Corporation,, USA; Katherine T Faber, Northwestern University, USA

Advanced Multifunctional Coatings: Processing and Characterization I
1:30 PM-3:30 PM
Room: Coquina Salon G
Session Chair(s): TBA

1:30 PM
(ICACC-S2-032-2014) Design of High Emissivity Coatings for Hypersonic Applications using Plasma Spray (Invited Speaker)
Rodney Trice*, Winnie Tan, Purdue, USA; Christopher Petorak, Praxair Surface Technology, USA

2:00 PM
(ICACC-S2-033-2014) High Velocity Flame Spraying of Nano-structured Materials and Related Industrial Applications (Invited Speaker)
Rainer Gadow*, Andreas Killinger, University of Stuttgart, Germany

2:30 PM
(ICACC-S2-034-2014) Tribological Studies of the Boride-Based Thermal Diffusion Coatings
Eugene Medvedovski*, Jiaren Jiang, Endurance Technologies Inc., Canada; Mark Robertson, NRC - EME, Canada

2:50 PM
(ICACC-S2-035-2014) Effect of microstructure and thickness on the friction and wear behavior of CrSiCN coatings
Oyelayo Ajayi*, Cinta Lorenzo-Martin, Sol Torrel, Ali Erdemir, Argonne Nat Lab, USA; Rong Wei, Southwest Research Institute, USA

3:10 PM
Break

Advanced Thermal Barrier Coatings: New Compositions, Processing, Testing Development II
3:30 PM-5:50 PM
Room: Coquina Salon G
Session Chair(s): TBA

3:30 PM
(ICACC-S2-036-2014) Structure and Thermal Conductivity of (La1-xGdx)2Zr2O7 TBCs Fabricated by Suspension Plasma Spray
Seongwon Kim*, Chang-Sup Kwon, Yoon-Suk Oh, Sung-Min Lee, Hyung-Tae Kim, Korea Institute of
Friday, January 31, 2014
Advanced Multifunctional Coatings: Processing and Characterization II

3:50 PM
(ICACC-S2-037-2014) La2Zr2O7 (LZ) coating by liquid feedstocks plasma spraying: Role of precursor
William Duarte*, Sylvie Rossignol, ENSCI-GEMH, France; Michel Vardelle, SPCTS, France

4:10 PM
(ICACC-S2-038-2014) Interface chemistry of rare-earth added YSZ films for TBC prepared by EB PVD
Yoon Suk Oh*, Chan-Young Park, Seong-Won Kim, Sung-Min Lee, Hyung-Tae Kim, KICET, Republic of Korea; Dae-Soon Lim, Korea University, Republic of Korea; Byung-Koog Jang, NIMS, Japan

4:30 PM
(ICACC-S2-039-2014) Non-line-of-sight vapor deposition of thermal barrier coatings
Theron M Rodgers*, Hengbei Zhao, Haydn Wadley, University of Virginia, USA

4:50 PM
(ICACC-S2-040-2014) Engineered multi-layered thermal barrier coatings for enhanced durability
Vaishak Viswanathan, Gopal Dwivedi*, Michael Flynn, Michael Miller, Sanjay Sampath, Stony Brook University, USA

5:10 PM
(ICACC-S2-041-2014) Measuring thermal barrier coating’s thermal conductivity on as-manufactured and ex-service components
Gregoire Witz*, Matthieu Esquerre, Hans-Peter Bosmann, Alstom (Switzerland) Ltd, Switzerland

5:30 PM
(ICACC-S2-042-2014) Study on hot corrosion behavior of YSZ-Ta2O5 thermal barrier coating in turbine simulated environment
Hamed Habibi*, Shengmin Guo, Louisiana State University, USA