

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

Wednesday, January 25, 2012
Thermal Barrier Coatings I

8:00 AM-12:00 PM

Room: Ponce de Leon

Session Chair(s): Uwe Schulz, Eric Jordan

8:00 AM

(ICACC-S2-001-2012) CMAS degradation of EB-PVD thermal barrier coatings: from solubility of ceramic oxides in CMAS to the development of CMAS-resistant ceramic compositions (Invited)

Marie-Helene Vidal-Setif*, Nezha Chellah, Catherine Rio, Denis Boivin, Odile Lavigne, ONERA, France; Michel Vilasi, Faculté des Sciences et Techniques, France

8:40 AM

(ICACC-S2-002-2012) Thermochemical Interaction of EB-PVD $Gd_2Zr_2O_7$ Thermal Barrier Coatings with Artificial Volcanic Ash

Peter Mechnich*, Wolfgang Braue, Uwe Schulz, German Aerospace Center (DLR), Germany

9:00 AM

(ICACC-S2-003-2012) Recession of EB-PVD YSZ Thermal Barrier Coatings: Interplay of Fe, Ti-rich CMAS-type Deposits and Anhydrite-type $CaSO_4$

Peter Mechnich*, Wolfgang Braue, German Aerospace Center (DLR), Germany

9:20 AM

(ICACC-S2-004-2012) The Effect of CMAS and Sintering on the Thermomechanical Stability of Plasma-Sprayed TBCs

Maya Shinozaki*, T. W Clyne, University of Cambridge, United Kingdom

9:40 AM

Break

10:00 AM

(ICACC-S2-005-2012) Cyclic life of EB-PVD thermal barrier coatings having novel compositions

Uwe Schulz*, German Aerospace Center, Germany

10:20 AM

(ICACC-S2-006-2012) Multilayered Thermal Barrier Coating Architectures for High Temperature Applications

Douglas E Wolfe, Michael P Schmitt, Penn State University Applied Research Lab, USA; Dongming Zhu, NASA Glenn Research Center, USA; Amarendra K Rai*, Rabi Bhattacharya, UES, Inc., USA

10:40 AM

(ICACC-S2-007-2012) Defect-dependent thermal conductivity of tetragonal yttria-stabilized zirconia

Andi M Limarga*, David R Clarke, Harvard University, USA

11:00 AM

(ICACC-S2-008-2012) Implications of the c/t' Transformation on Characterization Efforts of Thermally Aged TBCs

Jessica A Krogstad*, Maren Lepple, UCSB, USA; Yan Gao, Don M Lipkin, GE Global Research, USA; Carlos G Levi, UCSB, USA

11:20 AM

(ICACC-S2-009-2012) Development of pyrochlore materials for thermal barrier coatings deposited by suspension plasma spraying

Aurelien Joulia*, Sylvie Rossignol, Michel Vardelle, Marc Huger, Sylvie Foucaud, Centre Européen de la Céramique, France; Emelyne Renard, CNES, France; David Tchou-Kien, Centre Européen de la Céramique, France

11:40 AM

(ICACC-S2-010-2012) Structures of (LaxGd1-x)2Zr2O7 Oxide Systems for Thermal Barrier Coatings (TBCs)

Seongwon Kim*, Kil-ho Kwak, Sung-Min Lee, Yoon-Suk Oh, Korea Institute of Ceramics Engineering and Technology, Republic of Korea; Byung-Koog Jang, National Institute of Materials Science, Japan; Hyung-Tae Kim, Korea Institute of Ceramics Engineering and Technology, Republic of Korea

Thermal Barrier Coatings II

1:30 PM-5:20 PM

Room: Ponce de Leon

Session Chair(s): Yutaka Kagawa, Douglas Wolfe

1:30 PM

(ICACC-S2-011-2012) Foreign Object Damage Behavior of Thermal Barrier Coatings in Airfoil Components (Invited)

D. Calvin Faucett, Matthew Ayre, Jennifer Wright, Sung Choi*, Naval Air Systems Command, USA

2:00 PM

(ICACC-S2-012-2012) Solid Particle erosion of thermal spray and physical vapour deposition thermal barrier coatings

Federico Cernuschi*, Cristina Guardamagna, Lorenzo Lorenzoni, Ricerca per il Sistema

Energetico, Italy; Robert Vassen, Forschung Zentrum Julich, Germany; Konstantin von Niessen, Sulzer Metco AG, Switzerland; Carlo Giolli, Turbocoating SpA, Italy; Stefano Capelli, Ricerca per il Sistema Energetico, Italy; Francesco Bossi, Politecnico di Milano, Italy

2:20 PM

(ICACC-S2-013-2012) Structure Evolutions and Thermal Conductivities of Yttria-Lanthanum Zirconate Solid Solutions

Yanfei Wang*, Fan Yang, Ping Xiao, University of Manchester, United Kingdom

2:40 PM

(ICACC-S2-014-2012) Gd₂Zr₂O₇-YSZ composite for high temperature corrosion resistant thermal barrier coatings

Maria Ophelia Jarligo*, Daniel E Mack, Robert Vaßen, IEK-1, Forschungszentrum Jülich GmbH, Germany

3:00 PM

Break

3:20 PM

(ICACC-S2-015-2012) Challenges and Solutions to TGO Stress Measurement in Engine Run Gas Turbine Components (Invited)

Eric Jordan*, Mark Majewski, Colin Kelley, Jarod Lake, Michael Renfro, University of Connecticut, USA; Waled Hassan, William Brindley, Rolls Royce, USA

4:00 PM

(ICACC-S2-016-2012) Interfacial Delamination of Modeled APS-TBCs under Shear Loading: Effect of Difference in Chemical Composition of Bond Coat

Makoto Hasegawa*, Shou Yamaoka, Yokohama National University, Japan

4:20 PM

(ICACC-S2-017-2012) Methods for

Measurement and Analysis of Stress Components in Anisotropic TGO Growth Layer formed after Thermo-mechanical Fatigue

Tests of EB-PVD Y_2O_3 - ZrO_2 TBCs

Rumi Kitazawa*, Hideki Kakisawa, Yutaka Kagawa, The University of Tokyo, Japan

4:40 PM

(ICACC-S2-018-2012) Degradation of EB-PVD TBCs and (Ni,Pt)Al Coatings by Mixture of Sodium and Potassium Sulfate at 950°C

Le Zhou*, Sriparna Mukherjee, Yongho Sohn, University of Central Florida, USA

5:00 PM

(ICACC-S2-019-2012) Monitoring TBC Delamination Propagation during Cyclic Tests for Building of Lifting Models

Gregoire Witz*, Matthieu Esquerre, Hans-Peter Bossmann, Alstom (Switzerland) Ltd, Switzerland

Symposium 2: Poster Session

5:00 PM-7:30 PM

Room: Exhibition Hall, Ocean Center

(ICACC-S2-P027-2012) Original in-situ method to quantify the SiC active oxidation rate in Ar/H₂O gas mixtures at very high temperatures

Mathieu Quentin Brisebourg*, Francis Rebillat, Francis Teyssandier, LCTS, France

(ICACC-S2-P028-2012) Silicon Carbide Nanotube Oxidation at High Temperatures

Nadia Ahlborg*, The Ohio State University, USA; Dongming Zhu, NASA Glenn Research Center, USA

(ICACC-S2-P029-2012) Actual Toughness of Environmental Barrier Oxide Coatings on SiC/SiC Substrate

Takuya Matsumoto*, Hideki Kakisawa, Yutaka Kagawa, The University of Tokyo, Japan

(ICACC-S2-P030-2012) Thermal Conductivity and Microstructure of Y_2O_3 - ZrO_2 Coatings Fabricated by EB-PVD

Byung-Koog Jang*, Hideyuki Murakami, National Institute for Materials Science, Japan; Jiangang Sun, Argonne National Laboratory, USA; SeongWon Kim, Yoon-Suk Oh, Hyung-Tae Kim, Korea Institute of Ceramic Engineering and Technology, Republic of Korea

(ICACC-S2-P031-2012) Mesoporous Ti-Si-O-C composite thin film obtained by metalorganic chemical vapor deposition

Said M. El_sheikh*, O. A Fouad, Y. Y Ahmed, Central Metallurgical Research and Development Institute, Egypt

(ICACC-S2-P032-2012) Nanostructured Coating Process by Inductively Coupled Plasma Assisted Magnetron Sputtering

Sung-Yong Chun*, Dae-Han Seo, Do-Hyeon Yoon, Mokpo National University, Republic of Korea

(ICACC-S1-P033-2012) The Effect of Erbium and Ytterbium Oxide on the Creep Properties of 10 % SiC containing SiAlON Ceramics

Dilek Turan*, A. Uludag, Y. Deniz, S. Kayhan, Anadolu University, Turkey

(ICACC-S1-P034-2012) The Effect of Ytterbium and Cerium Oxide Double Doping on Atomic Scale Microstructure and Properties of SiAlON Ceramics

Servet Turan*, H. Yurdakul, Anadolu University, Turkey; J. C Idrobo, Oak Ridge National Laboratory, USA; S. J Pennycook, Vanderbilt University, USA; E. Okunishi, JEOL Ltd., Japan

Thursday, January 26, 2012
**Environmental Barrier
Coatings and Protective
Coating-Component
Systems for Extreme
Environments**

8:00 AM-12:00 PM

Room: Ponce de Leon

Session Chair(s): Peter Mechnich, Sung Choi

8:00 AM

(ICACC-S2-020-2012) Hot gas corrosion and EBC development of non-oxide ceramic materials (Invited)

Hagen Klemm*, Axel Bales, Katrin Schoenfeld, Alexandee Michaelis, Fraunhofer IKTS, Germany

8:40 AM

(ICACC-S2-021-2012) The effect of oxidation resistant fillers on bond-coats for EBC on silicon-based ceramics

Charles Lewinsohn*, Hyrum Anderson, Joshua Johnston, Ceramatec, Inc., USA; Ramakrishna Bhatt, Dongming Zhu, NASA Glenn Research Center, USA

9:00 AM

(ICACC-S2-022-2012) Thermal Stability and Expansion Properties of Rare Earth Monosilicates

Pankaj Sarin*, Daniel R Lowry, Zlatomir D Apostolov, Joachim Angelkort, Zachary A Jones, Waltraud M Kriven, University of Illinois at Urbana-Champaign, USA

9:20 AM

(ICACC-S2-023-2012) Thermal Expansion and Phase Transitions of Rare Earth Disilicates

Thomas Key*, Emmanuel E Boakye, UES /

AFRL, USA; Kayla F Presley, Randall S Hay, AFRL, USA

9:40 AM

Break

10:00 AM

(ICACC-S2-024-2012) Develop Eu³⁺ doped YPO₄ Environmental Barrier Coating for Self-health-monitoring (Invited)

Yiguang Wang*, Wen Liu, Laifei Cheng, Northwestern Polytechnical University, China

10:30 AM

(ICACC-S2-025-2012) Testing of Candidate Rigid Heatshield Materials at LHMEI for the Entry, Descent, and Landing Technology Development Project

Steven Sepka*, ERC/NASA-Ames, USA; Robin Beck, Susan White, NASA Ames Research Center, USA

11:00 AM

(ICACC-S2-026-2012) A SiC/SiC-MoSi₂-ZrB₂ double-layer oxidation resistant coating for carbon/carbon composites

Hejun Li*, Xiyuan Yao, Yulei Zhang, Xiaohong Shi, Northwestern Polytechnical University, China

11:20 AM

(ICACC-S2-027-2012) Novel PDC based composite coating to protect mild steel in very harsh environments

Guenter Motz*, Martin Guenther, Uwe Glatzel, Adelheid Schuetz, University of Bayreuth, Germany; Kaishi Wang, Rajendra K Bordia, University of Washington, USA

11:40 AM

(ICACC-S2-028-2012) In-situ observation of the active/passive transition of SiC oxidation under Ar/O₂ gas mixtures at very high temperatures

Mathieu Quentin Brisebourg*, Francis Rebillat,
Francis Teyssandier, LCTS, France

Coatings to Resist Wear, Erosion and Extreme Environments

1:30 PM-5:30 PM

Room: Ponce de Leon

Session Chair(s): Oyelayo Ajayi, Irene Spitsberg

1:30 PM

(ICACC-S2-029-2012) Investigation of Coating Failure Behavior under Extremely High Impact and Sliding Load Conditions (Invited)

Jun F Su, Xueyuan Nie*, Henry Hu, University of Windsor, Canada

2:00 PM

(ICACC-S2-030-2012) Modeling and Ab-Initio Simulation of Amorphous Coatings (Invited)

Peter Kröll*, UT Arlington, USA

2:30 PM

(ICACC-S2-031-2012) Effect of stoichiometry of ceramic interlayers pre-coated on WC-Co on diamond coatings by MPCVD

Yuanshi Li*, Yongji Tang, Linlin Zhang, Qiaoqin Yang, Akira Hirose, University of Saskatchewan, Canada

2:50 PM

Break

3:10 PM

(ICACC-S2-032-2012) Effect of Hard Coatings on Tribochemical Film Behavior in Lubricated Sliding Contact

Maria Cinta Lorenzo Martin*, Oyelayo O Ajayi, Sol Torrel, Nicholaos Demas, George Fenske, Argonne National Laboratory, USA

3:30 PM

(ICACC-S2-033-2012) Evaluations of Multilayer Coatings for Galvanic Corrosion Resistance Applications

Chi Qu, Alfred University, USA; Richard Kasica, NIST, USA; Ronghua Wei, Southwest Research Institute, USA; Eric McCarty, 4. Materials Technologies Consulting, USA; Jinghong Fan, Doreen Edwards, Gerry Wynick, Xingwu Wang*, Alfred University, USA

3:50 PM

(ICACC-S2-034-2012) Formation of nano dispersed ceramic-metallic composite coatings

Ratan Saha*, M. A Farrokhzad, Tahir I Khan, University of Calgary, Canada

4:10 PM

(ICACC-S2-035-2012) Nanoindentation and tribological properties of magnetron sputtered WC-C coatings

Frantisek Lofaj*, Milan Ferdinandy, Peter Hornak, Institute of Materials Research of SAS, Slovakia; Gregorz Cempura, AGH-UST, Poland

4:30 PM

(ICACC-S2-036-2012) Enhancing the performance and lifetime of ceramic components in critical applications through the use of carbon based coating technology

Chris H Walker*, Diamond Hard Surfaces Ltd, United Kingdom

4:50 PM

(ICACC-S2-037-2012) Rare earth oxide reinforced Al₂O₃-TiO₂ ceramics coating for metal matrix in petroleum industry

Yogendra Prasad Yadava*, Sheila A Rêgo, Catarina E Mendes, Ricardo A Sanguinetti Ferreira, Universidade Federal de Pernambuco, Brazil

5:10 PM

(ICACC-S2-038-2012) A Novel Hybrid Nanomanufacturing Ceramic Coating and Surface Engineering Process: Cubic Boron Nitride Coating, a Case Study

Ajay Malshe*, NanoMech Inc., USA; Wenping Jiang, University of Arkansas, USA

Friday, January 27, 2012

Advanced Processing and Protective Coating Systems for Extreme Environments

8:20 AM-11:20 AM

Room: Ponce de Leon

Session Chair(s): Houzheng Wu, Byung-Koog Jang

8:20 AM

(ICACC-S2-039-2012) Growing Integration Layer [GIL] Method: Direct Fabrication of Compositionally, Structurally and Functionally Graded Ceramic Films and/or Coatings from Mother Materials in Solution (Invited)

Masahiro Yoshimura*, National Cheng Kung University, Taiwan; Nobuhiro Matsushita, Tokyo Institute of Technology, Japan

9:00 AM

(ICACC-S2-040-2012) Acoustic field assisted drying of electrophoretically deposited green bodies for ceramic coatings

Changzheng Ji, Houzheng Wu*, Loughborough University, United Kingdom

9:20 AM

(ICACC-S2-041-2012) Failure Mechanism and Reliability of Pt-Pt/Rh Temperature Sensor in Extreme Environments

Eric Allain, Watlow R&D, USA; Hongy Lin*, Watlow Sensor Division, USA

9:40 AM

Break

10:00 AM

(ICACC-S2-042-2012) Improvement in corrosion resistance of reaction bonded Si₃N₄-SiC ceramics to molten aluminum alloy using oxide coatings

Masashi Wada*, Kazumi Kashiwagi, Satoshi Kitaoka, Japan Fine Ceramics Center, Japan

10:20 AM

(ICACC-S2-043-2012) Characterization of sealing treatments on the behavior of aluminium phosphate sealed plasma - sprayed alumina coatings operating in extreme environment

Alexandre Joly*, Patrice Brun, Jacques Lacombe, Commissariat à l'énergie atomique, France; Grégory Tricot, Université des Sciences et Technologies de Lille, France; Alain Denoirjean, Sylvie Rossignol, Centre Européen de la Céramique, France

10:40 AM

(ICACC-S2-044-2012) Electrochemical and morphological study on nanoceramic based conversion coating on CRS: The effect of solution pH

Hossein Eivaz Mohammadloo*, Ali Asghar Sarabi, Amirkabir university of technology, Islamic Republic of Iran; Ali Asghar Sabbagh Alvani, Color and Polymer Research Center, Amirkabir University of Technology, Islamic Republic of Iran; Reza Salimi, Hassan Sameie, Amirkabir university of technology, Islamic Republic of Iran