SYMPOSIUM 4: Armor Ceramics

Monday, January 27, 2014

Special Topic Focus: Adhesive Bonding

1:30 PM-2:40 PM
Room: Coquina Salon E
Session Chair(s): Lionel Vargas-Gonzalez

1:30 PM
(ICACC-S4-001-2014) Surface treatment of alumina and silicon carbide for improved adhesive bond strength in armour (Invited Speaker)
Andrew Harris*, Julie Yeomans, Paul Smith, University of Surrey, United Kingdom; Bryan Vaughan, Steve Burnage, Lockheed Martin UK, United Kingdom

2:00 PM
(ICACC-S4-002-2014) Surface Modification of Ballistic Ceramic and Composite Materials by Use of Atmospheric Pressure Plasma
Lionel Vargas-Gonzalez*, Victor Rodriguez-Santiago, Andres Bujanda, U.S. Army Research Lab, USA

2:20 PM
(ICACC-S4-003-2014) The Application of Materials Analytics to Explore Adhesive Performance
Matthew S Bratcher*, U.S. Army Research Laboratory, USA; Michael C Golt, Bowhead Science and Technology, LLC, USA; Robert Jensen, Wendy Kosik, U.S. Army Research Laboratory, USA

Glass and Transparent Ceramics

2:40 PM-5:40 PM
Room: Coquina Salon E
Session Chair(s): Jeffrey Swab

2:40 PM
(ICACC-S4-004-2014) Hardness and Crack Resistance of Oxide Network Glasses
Morten M Smedskjaer*, Aalborg University, Denmark

3:00 PM
Break

3:20 PM
(ICACC-S4-005-2014) Comparison of Starphire and BOROFLOAT Characteristics
Andrew Wereszczak*, Oak Ridge National Laboratory, USA

3:40 PM
(ICACC-S4-006-2014) Investigation of failure mechanisms in glass under dynamic loading using high speed x-ray phase contrast imaging
Niranjan Parab, Matthew C Hudspeth, Ben Claus, John T Black, Purdue University, USA; Shengnian Luo, Sichuan University, China; Kamel Fezzaa, Xianghui Xiao, Argonne National Laboratory, USA; Wayne W Chen*, Purdue University, USA

4:00 PM
(ICACC-S4-007-2014) Nucleation and Growth of Internal Cracks in Glass
Don Shockey*, Takao Kobayashi, Timothy J Holmquist, SRI International, USA; Andrew A Wereszczak, Oak Ridge National Laboratory, USA

4:20 PM
(ICACC-S4-008-2014) Detecting and Mapping Flaw Size Distributions on Glass Surfaces
Andrew Wereszczak*, Mattison Ferber, Oak Ridge National Laboratory, USA

4:40 PM
(ICACC-S4-009-2014) Transparent Ceramics for Demanding Optical Applications
Marina R. Pascucci*, Mark V Parish, Normand D Corbin, Brenda Boucher-Puputti, CeraNova Corporation, USA

5:00 PM
(ICACC-S4-010-2014) Highly Transparent Alumina Ceramics Prepared by Combined SPS/HIP process
Martin Trunec*, Jaroslav Kastyl, Brno University of Technology, Czech Republic; Zhijian J Shen, Stockholm University, Sweden

5:20 PM
(ICACC-S4-011-2014) Optimization of the spark plasma sintering condition for transparent spinel
Minh Vu*, Richard Haber, Rutgers University, USA

Tuesday, January 28, 2014

Special Topic Focus: Boron Carbide I

8:30 AM-12:00 PM
Room: Coquina Salon E
Session Chair(s): Jerry LaSalvia

8:30 AM
(ICACC-S4-012-2014) On microstructure and electronic properties of boron carbide (Invited Speaker)
Helmut Werheit*, University Duisburg-Essen, Germany

9:00 AM
(ICACC-S4-013-2014) Synchrotron X-ray Diffraction and Raman Spectroscopy Studies of Elasticity and Structure of B4C to 70 GPa
Murli H. Manghnani*, Przemyslaw Dera, Anwar Hushur, University of Hawaii, USA

9:20 AM
(ICACC-S4-014-2014) Strain-Rate Sensitivity of the Amorphized Zone Surrounding Quasistatic and Dynamic Vickers Indentations in Boron Carbide
Gregory Parsard*, Ghatu Subhash, University of Florida, USA

9:40 AM
Break

10:00 AM
(ICACC-S4-015-2014) Further Results on the Characterization of Knoop Indents in Boron Carbide
Jerry LaSalvia*, Eugene Shanholtz, Kris Behler, U.S. Army Research Laboratory, USA; Vlad Domnich, Rutgers University, USA; Ken Strawhecker, Scott Walck, U.S. Army Research Laboratory, USA

10:20 AM
(ICACC-S4-016-2014) Stability of Indentation-Induced Amorphous Boron Carbide: Effect of Annealing Treatments
Vladislav Domnich*, Rutgers Univ, USA; Jerry C LaSalvia, U.S. Army Research Laboratory, USA; Richard A Haber, Rutgers Univ, USA; Eugene R Shanholtz, U.S. Army Research Laboratory, USA

10:40 AM
(ICACC-S4-017-2014) Compressive Strength of Single-Crystal Boron Carbide Micropillars
Jonathan Ligda*, Army Research Laboratory, USA; Vladislav Domnich, Rutgers University, USA; Takaho Tanaka, National Institute for Materials Science, Japan; Jerry LaSalvia, Brian Schuster, Army Research Laboratory, USA

11:00 AM
(ICACC-S4-018-2014) Synthesis and Consolidation of Submicron-Grained Boron Carbide
Kendall Conrad Mills*, Christopher D Haines, Rajendra K Sadangi, Darold G Martin, Deepak Kapoor, US ARMY, USA

11:20 AM
(ICACC-S4-019-2014) Optimization of the Process of Boron Carbide Precursors
Yong Gao*, Rafaniello William, Fatih Toksoy, Tyler Munhollon, Richard Haber, Rutgers, The State University of New Jersey, USA

11:40 AM
(ICACC-S4-020-2014) Assessing the Carbon Concentration in Boron Carbide: A Combined X-Ray Diffraction and Chemical Analysis

Kanak A Kuwelkar*, Vladislav Domnich, Richard A Haber, Rutgers University- New Brunswick, USA

Special Topic Focus: Boron Carbide II

1:20 PM-5:10 PM
Room: Coquina Salon E
Session Chair(s): Vladislav Domnich

1:20 PM
(ICACC-S4-021-2014) Densification of Commercial and Rapid Carbothermal Synthesized Boron Carbide
Muhammet Fatih Toksoy*, William Rafaniello, Richard A Haber, Rutgers University, USA

1:40 PM
(ICACC-S4-022-2014) Effect of SiO_2 and B_2O_3 Additives on the Microstructure and Hardness of Hot-Pressed Boron Carbide
Kristopher D. Behler*, Eugene R Shanholtz, U.S. Army Research Laboratory, USA; Kelvin Xie, Johns Hopkins University, USA; Jerry C LaSalvia, U.S. Army Research Laboratory, USA

2:00 PM
(ICACC-S4-023-2014) Improving the Hardness and Toughness of Boron Carbide Using Alumina as a Sintering Aid
Kelvin Xie*, Johns Hopkins University, USA; Fatih Toksoy, Rutgers University, USA; Jerry LaSalvia, The Army Research Lab, USA; Richard Haber, Rutgers University, USA; Kevin Hemker, Johns Hopkins University, USA

2:20 PM
(ICACC-S4-024-2014) Novel Synthesis and Densification of Ultra-Hard Boron Suboxide
Robert Pavlacka*, Gary Gilde, Kelvin Xie, Kevin Hemker, U.S. Army Research Laboratory, USA

2:40 PM
(ICACC-S4-025-2014) Application of mechanism-based, defect-distribution-driven analytical model for dynamic brittle failure to boron carbide
Nitin Daphalapurkar*, Johns Hopkins University, USA

3:00 PM
Break

3:20 PM
(ICACC-S4-026-2014) Mechanical properties of icosahedral boron carbide explained from first principles (Invited Speaker)
Nathalie Vast*, Ecole Polytechnique, France

3:50 PM
(ICACC-S4-027-2014) First Principles Based Multiscale Multiparadigm Simulations on Boron Carbide (B4C), boron, and Related icosahedral materials aimed of developing improved performance (Invited Speaker)
William A. Goddard*, Andres Jaramillo-Botero, Qi An, Hai Xiao, Sergey Zybin, California Institute of Technology, USA

4:20 PM
(ICACC-S4-028-2014) Modeling Nonlinear Elasticity, Intrinsic Instability, and Failure of Boron Carbide (Invited Speaker)
John Clayton*, US ARL, USA

4:50 PM
(ICACC-S4-029-2014) Quantum Mechanical Study of Fracture in Boron Carbide
Todd D. Beaudet*, Army Research Laboratory, USA; John R Smith, University of Michigan, USA

Wednesday, January 29, 2014

Modeling

8:00 AM-9:00 AM
Room: Coquina Salon E
Session Chair(s): Costas Fountzoulas

8:00 AM
(ICACC-S4-030-2014) Using Micromechanics-based Models to Inform the Design of Advanced Ceramic Materials
Andrew L Tonge*, Kaliat T Ramesh, The Johns

Hopkins University, USA

8:20 AM
(ICACC-S4-031-2014) Numerical study of stress and fracture propagation in glass during ring-on-ring testing
Costas G Fountzoulas*, Jeffrey J Swab, Parimal J Patel, U.S.Army Research Laboratory, USA

8:40 AM
(ICACC-S4-032-2014) Prediction of roughness in transverse crack surfaces from impact on a glass-polycarbonate two-layer system
Florin Bobaru*, Yenan Wang, University of Nebraska-Lincoln, USA; Jian Yu, Chian-Fong Yen, ARL, USA

Testing and Evaluation / Materials Characterization / Quasi-Static and Dynamic Behavior I

9:00 AM-12:00 PM
Room: Coquina Salon E
Session Chair(s): Sikhanda Satapathy

9:00 AM
(ICACC-S4-033-2014) Characterization of Silicon Carbide Microstructure Using Nondestructive Ultrasound Techniques
Vincent DeLucca*, Richard A Haber, Rutgers University, USA

9:20 AM
(ICACC-S4-034-2014) The Effect of Microstructure on the Static and Dynamic Mechanical Response of Reaction Bonded B4C-SiC-Si Ceramics
Phillip Jannotti*, Ghatu Subhash, University of Florida, USA

9:40 AM
Break

10:00 AM
(ICACC-S4-035-2014) Shock experiments to study source of inelasticity in ceramics
Sikhanda Satapathy*, Cyril Williams, Datta Dandekar, U.S. Army Research Lab, USA

10:20 AM
(ICACC-S4-036-2014) Direct and Reverse Electromechanical Response of Piezoelectric Ceramics under Impact
Logan Shannahan, Leslie Elise Lamberson*, Drexel University, USA

10:40 AM
(ICACC-S4-037-2014) High-Rate Three-Point Flexure of Ceramic Materials using a Three-Bar Kolsky Method
Daniel Casem*, Jeffrey Swab, Ajmer Dwivedi, Jared Wright, U.S. Army Research Lab, USA

11:00 AM
(ICACC-S4-038-2014) Static and dynamic fracture toughness of Sintered and Reaction Bonded SiC and B_4C composites
John J Pittari*, Ghatu Subhash, University of Florida, USA

11:20 AM
(ICACC-S4-039-2014) Analysis of Interacting Cracks Due to Sequential Indentations on Single Crystal SiC
Alison Trachet, Ghatu Subhash*, University of Florida, USA

11:40 AM
(ICACC-S4-040-2014) An Innovative Transmission Electron Microscopy Sample Preparation Technique for Heavily Deformed Ceramic Materials
Claire V (Weiss) Brennan*, US Army Research Lab, USA; Scott D Walck, Bowhead Science & Technology, USA; Jeffrey J Swab, US Army Research Lab, USA

Testing and Evaluation / Materials Characterization / Quasi-Static and Dynamic Behavior II

1:20 PM-5:20 PM
Room: Coquina Salon E
Session Chair(s): Matthew Bratcher

1:20 PM
(ICACC-S4-041-2014) Design of Ballistic Resistance Nano Ceramic-Plastic Composites
Nripati Ranjan Bose*, Dipayan Sanyal, Central Glass & Ceramic Research Institute, India

1:40 PM
(ICACC-S4-042-2014) Effect of novel geometric designs on the performance of ceramics against projectile impact
Prashant Karandikar*, Michael Aghajanian, Brian Givens, Anthony Liszkiewicz, Stephen Wong, M Cubed Technologies, Inc., USA

2:00 PM
(ICACC-S4-043-2014) Ceramic Matrix Composite Enhanced Armor Structures
Art Fortini, Jack Stiglich*, Ultramet, USA

2:20 PM
(ICACC-S4-044-2014) Testing method for ceramic armor and bare ceramic tiles
Erik Carton*, Geert Roebroeks, TNO, Netherlands

2:40 PM
(ICACC-S4-045-2014) Flash X-ray cinematography analysis of the interaction of small caliber projectiles with different types of SiC ceramics
Elmar Strassburger*, Steffen Bauer, Fraunhofer EMI, Germany; Steffen Weber, DLR Institute of Structures and Design, Germany

3:00 PM
Break

3:20 PM
(ICACC-S4-046-2014) Surface constraint effects on ceramic ballistic performance
Jason McDonald, Sikhanda Satapathy*, U.S. Army Research Lab, USA

3:40 PM
(ICACC-S4-047-2014) Properties and Performance of Cubic-Boron Nitride
Jeffrey Swab*, Elizabeth Wilson, Lionel Vargas, Eric Warner, Army Research Laboratory, USA

4:00 PM
(ICACC-S4-048-2014) Influence of the Crystal Structure on the Performance of Single Crystalline Transparent Armor
Andreas Krell*, Fraunhofer IKTS, Germany; Elmar Strassburger, Fraunhofer EMI, Germany

4:20 PM
(ICACC-S4-049-2014) Analysis of the Fragmentation of AlON and Three $MgAl_2O_4$ Spinels under Ballistic Impact
Elmar Strassburger, Martin Hunzinger, U.S. Army Research Laboratory, USA; Parimal Patel, Fraunhofer Institute for High-Speed Dynamics, Germany; James W. McCauley*, U.S. Army Research Laboratory, USA

4:40 PM
(ICACC-S4-050-2014) Ballistic damage of alumina ceramics - learning from fragments
Houzheng Wu*, Santonu Ghosh, Loughborough University, United Kingdom; Claire Dancer, University of Warwick, United Kingdom; Richard Todd, University of Oxford, United Kingdom

5:00 PM
(ICACC-S4-051-2014) Evaluating the Rock Strike Resistance of Transparent Armor Materials
Brandon S Aldinger*, Ibis Tek, LLC, USA