Preliminary Program

(August 12, 2022)

Ceramic Matrix Composites II: Science and Technology of Materials, Design, Applications, Performance and Integration

November 13 – 18, 2022
LaFonda on the Plaza
Santa Fe, New Mexico, USA

Conference Chairs

Dr. Ram Darolia
GE Aviation (Retired), USA

Prof. Yutaka Kagawa
Tokyo University of Technology, Japan

Prof. Jon Binner
University of Birmingham, United Kingdom

Prof. Rishi Raj
University of Colorado, USA

Prof. Dietmar Koch
University of Augsburg, Germany

Prof. Gerard Vignoles
University of Bordeaux, France

Conference Secretaries

Prof. Ken Goto
Japan Aerospace exploration agency (JAXA), Japan

Dr. Satoshi Kitaoka
Japan Fine Ceramics, (JFCC), Japan

Engineering Conferences International
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Sunday, November 13, 2022

16:30 – 18:30	Conference check-in
18:30 – 20:30	Reception followed by Dinner with Native American flute band

Monday, November 14, 2022

07:00 – 08:15	Breakfast
08:15 – 08:30	**Opening Remarks** Conference Chair and ECI Liaison: Ram Darolia
	Session 1: Overviews and Applications Chair: TBD
08:30 – 09:00	**Ceramic Matrix Composites (CMCs) at GE: From inception to commercialization** Krishan Luthra, GE Research, USA
09:00 – 09:30	**Industrialization of ceramic matrix composites for aerospace applications** Mano Manoharan, GE Aviation, USA
09:30 – 10:00	**Development of ceramic matrix composites for 2500°F turbine engine applications** Olivier Sudre, Pratt & Whitney, USA
10:00 – 10:30	Coffee Break
10:30 – 11:00	**Brief overview of CMCs engine components experiments coupled with representative sub-element tests** Eric Bouillon, Safran Ceramics, France
11:00 – 11:30	**Multi-scale study of ceramic composite materials for aeronautical applications** Sébastien Denneulin, Safran Ceramics, France
11:30 – 12:00	**Ceramic matrix composites for liner system of radioactive waste disposal cells** Emilie Perret, High Performance Multifunctional Materials Domain IRT Saint Exupéry, France
12:00 – 12:30	**Development of CMC for nuclear fuel components** Toshiki Nishimura, Toshiba Energy Systems & Solutions Corporation, Japan
12:30 – 14:00	Lunch
	Session 1: Overviews and Applications (continued) Chair: TBD
14:00 – 14:30	**International reliability assessment project through standard PateranoSiC(SiC/SiC)** Chikara Fujiwara, Tokyo University of Technology, Japan
14:30 – 15:00	**Overview of CMC activities: From high temperature characterization to applications** Guillaume Pujol, DGA, France
15:00 – 15:30	**Industrial application of all oxide ceramic matrix composites** Walter Pritzkow, Walter E.C. Pritzkow Spezialkeramik, Germany
15:30 – 16:00	Coffee Break

Monday, November 14, 2022 (continued)

16:00 – 16:30	**Advances and technical challenges in development of CMC** Takeshi Nakamura, IHI Corporation, Japan
16:30 – 17:00	**Current trends in CMC research & development across DLR's technology programs** Peter Mechnich, German Aerospace Center (DLR), Germany
17:00 – 17:30	**CVI manufacturing routes of non-oxide CMCs** Ryan Skillett, Archer Technicoat Ltd., United Kingdom
17:30 – 18:30	**Discussion** Leader: TBD
18:30 – 20:00	Dinner
20:00 – 22:00	Poster Session with drinks and light snacks

Tuesday, November 15, 2022

07:00 – 08:30	Breakfast
	Session 2: Processing and Characterization Chair: TBD
08:30 – 09:00	**Multiphysics modeling of ceramic-matrix composites processing by thermal-gradient chemical vapor infiltration** Gerard Vignoles, University of Bordeaux, LCTS, France
09:00 – 09:30	**In-situ observation and multi-physics simulation of reactive melt Infiltration of silicon melt into SiC-C Preform** Takeshi Yoshikawa, The University of Tokyo, Japan
09:30 – 10:00	**Processing and characterization of layered UHTCMCs reinforced with continuous or discontinuous carbon fibers** Diletta Sciti, National Research Council of Italy, CNR-ISTEC, Italy
10:00 – 10:30	Coffee Break
10:30 – 11:00	**Processing, performance and process modeling of preceramic polymers** Thomas Key, Air Force Research Laboratory, USA
11:00 – 11:30	**Effect of matrix porosity and prepreg-tack on mechanical properties and processing of oxide ceramic matrix composites** Stefan Schafföner, University of Bayreuth, Germany
11:30 – 12:00	**Polymer-derived ceramic fibers: A state-of-the-art review** Samuel Bernard, CNRS-IRCER, France
	Session 3: Physical and Mechanical Property Testing and Characterization Chair: TBD
12:00 – 12:30	**Small-scale testing of ceramic matrix composites** Oriol Gavalda-Diaz, Imperial College London, United Kingdom
12:30 – 13:00	**Simulation assisted study on structural degradation in advanced SiC/SiC CMC component during high-temperature fatigue** Eiichi Sato, ISAS/JAXA, Japan
13:00 – 14:00	Box Lunch Excursion: Bandelier National Park, Brewery Tour
18:30 – 20:00	Dinner on your own

Wednesday, November 16, 2022

07:00 – 08:30	Breakfast
	Session 3: Physical and Mechanical Property Testing and Characterization (continued) Chair: TBD
08:30 – 09:00	**Multicriteria optimization as enabler for Sustainable Ceramic Matrix Composites (SCMC)** Dietmar Koch, University of Augsburg, Germany
09:00 – 09:30	**Cumulative fracture behavior of short fiber type C/SiC** Ken Goto, Japan Aerospace Exploration Agency, Japan
09:30 – 10:00	**Fragmentation, sliding and interface degradation in SiC/SiC composites** Frank Zok, UC Santa Barbara, USA
10:00 – 10:30	Coffee Break
10:30 – 11:00	**Influence of pyrocarbon interphase characteristics on mechanical properties of tubular SiC/SiC composites made of 3rd generation Hi-Nicalon S, Tyranno SA3 and Tyranno SA4 fibers** Cédric Sauder, CEA, France
11:00 – 11:30	**A method for estimating constitutive properties of a C/C-SiC composite materials based on a Brazilian disc specimen** Royi Padan, Tel-Aviv University, Israel
11:30 – 12:00	**Utilizing the electrical properties of non-oxide ceramic composites to diagnose damage development, test conditions and defects** Gregory Morscher, University of Akron, USA
12:00 – 12:30	**Detection of damage evolution in SiC/SiC under tensile loading using Talbot-Lau X-ray interferometer** Yoshihisa Tanaka, Tokyo University of Technology, Japan
12:30 – 14:00	Lunch
14:00 – 14:30	**Micro-scale observation of cracking in SiC/BN/SiC ceramic matrix composites** Kaitlin Detwiler, Air Force Research Laboratory, USA
14:30 – 15:00	**Mechanical characterization of CMC at very high temperatures** Thomas Reimer, German Aerospace Center (DLR), Germany
15:00 – 15:30	**Microscale characterization of CMCs using 3D tomography techniques and machine learning algorithms to quantify and correlate initial microstructure to damage evolution** Ashley Hilmas, Air Force Research Lab, USA
15:30 – 16:00	Coffee Break

Wednesday, November 16, 2022 (continued)

Session 4: Modeling and Simulation
Chair: TBD

16:00 – 16:30 **Lifetime prediction of self-healing ceramic-matrix composites using a multi-physics image-based model**
Guillaume Couégnat, CNRS, France

16:30 – 17:00 **Models for subcritical crack growth during static fatigue of SiC fiber in air and steam**
Randall Hay, USAF/AFRL, USA

17:00 – 18:00 **Discussion**

18:00 – 22:30 Reception and Banquet

Thursday, November 17, 2022

07:00 – 08:30	Breakfast
	Session 4: Modeling and Simulation (continued) Chair: TBD
08:30 – 09:00	**Generation and evaluation of 3D digital twin of ceramic matrix composites using deep convolutional neural networks** Naohiro Shichijo, Hitotsubashi University, Japan
09:00 – 09:30	**Nonlinear continuum damage models for ceramic matrix composites with significant in plane ply anisotropy** Craig Przybyla, Air Force Research Laboratory, USA
09:30 – 10:00	**Proposition and validation of a damage and failure approach for 3D woven composite materials with ceramic matrix: From elementary coupons to composite structures** Frédéric Laurin, ONERA, University Paris Saclay, France
10:00 – 10:30	Coffee Break
	Session 5: New Developments and Applications Chair: TBD
10:30 – 11:00	**High and ultra-high temperature ceramic matrix composites fabricated by rapid chemical vapor infiltration** Jon Binner, University of Birmingham, United Kingdom
11:00 – 11:30	**New BN coating on SiC fibers as the interphase of SiC/SiC composites** Takahiro Sekigawa, Mitsubishi Heavy Industries Aero Engines, Ltd., Japan
11:30 – 12:00	**Laser-CVD silicon carbide fibers as non woven preforms in fiber-reinforced SiC-SiC composites** Mark Schaefer, Free Form Fibers, USA
12:00 – 12:30	**Development of oxide-based CMCs with high thermal stability** Isao Yamashita, Tosoh Corporation, Japan
12:30 – 13:00	**From dental cement to damage tolerant CMCs** Erin Valenzuela, University of Birmingham, United Kingdom
13:00 – 14:30	Lunch
	Session 6: Environmental Behavior Chair: TBD
14:30 – 15:00	**Synergistic degradation mechanisms of SiC/BN/SiC in oxidizing environments at intermediate temperatures under load** Elizabeth Opila, University of Virginia, USA
15:00 – 15:30	**Modeling environmental degradation in SiC/BN/SiC CMCs** Pavel Mogilevsky, UES Inc., USA

Thursday, November 17, 2022 (continued)

15:30 – 16:00	**NASA Glenn high temperature EB-coated CVI SiC/SiC minicomposite testing and characterization** Douglas Kiser, NASA Glenn Research Center, USA
16:00 – 16:30	Coffee Break
16:30 – 17:00	Open
17:00 – 18:00	**Discussion** Leader: TBD
18:30 – 20:00	Dinner

Friday, November 18, 2022

07:00 – 08:30	Breakfast
	Session 7: Environmental Barrier Coatings Chair: TBD
08:30 – 09:00	**The current status of advanced environmentanl barrier coatings for ceramic matrix composites at NASA** Kang Lee, NASA Glenn Research Center, USA
09:00 – 09:30	**Mass transfer control in multilayer EBC systems at high temperatures** Stoshi Kitaoka, Japan Fine Ceramics Center, Japan
09:30 – 10:00	**Hafnium and silicon based environmental barrier coatings** Rishi Raj, University of Colorado Boulder, USA
10:00 – 10:30	Coffee Break
10:30 – 11:00	**Solid particle erosion of environmental barrier coatings and ceramic matrix composites** Michael Presby, NASA Glenn Research Center, USA
11:00 – 11:30	**TGO growth behavior of modified environmental barrier coating systems** Dianying Chen, Oerlikon Metco (US) Inc., USA
11:30 – 12:00	**Development of EBCs and T/EBC multi-layer coatings: Challenges and implications** Ravisankar Naraparaju, German Aerospace Center (DLR), Germany
12:00 – 13:00	**Discussion**
13:00 – 14:00	Lunch Departure