

Preliminary Program

(August 17, 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

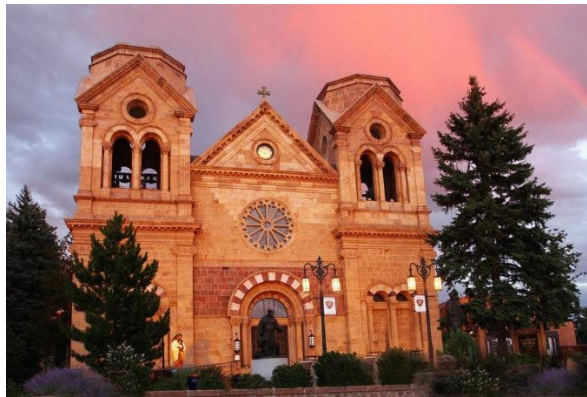
Prof. Dietmar Koch
University of Augsburg, Germany

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

32 Broadway, Suite 314 - New York, NY 10004, USA

www.engconfintl.org – info@engconfintl.org

Sunday, November 13, 2022

16:30 – 18:30 Conference check-in

18:30 – 20:30 Rooftop Reception followed by Dinner

Monday, November 14, 2022

- 07:30 – 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 /Social Hour |

Tuesday, November 15, 2022

07:30 – 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 Lunch

14:00 – 15:30 Walking tour of Santa Fe followed by free time

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 environmental 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