

## ***Preliminary Program***

*(September 23, 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

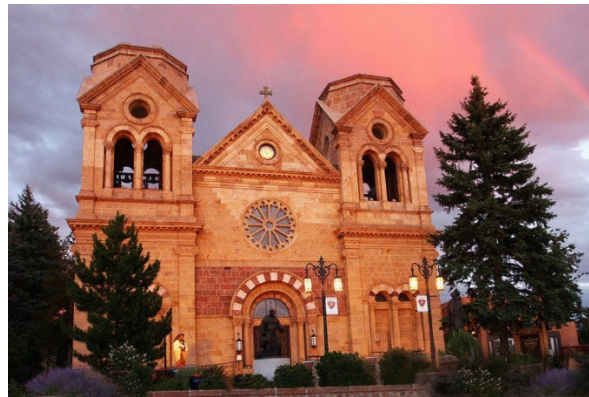
**Prof. Dietmar Koch**  
University of Augsburg, Germany

**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](mailto: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            **SiC/SiC ceramic matrix composite – A turbine engine perspective**  
Thomas Nixon, Rolls-Royce Corporation, USA
- 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 | <b>Advances and technical challenges in development of CMC</b><br>Takeshi Nakamura, IHI Corporation, Japan   |
| 16:30 – 17:00 | <b>Current trends in CMC research &amp; development across DLR's technology programs</b><br>Peter Mechnich, German Aerospace Center (DLR), Germany |
| 17:00 – 17:30 | <b>CVI manufacturing routes of non-oxide CMCs</b><br>Ryan Skillett, Archer Technicoat Ltd., United Kingdom   |
| 17:30 – 18:00 | <b>Discussion</b><br>Leader: TBD   |
| 18:00 – 19:30 | Dinner   |
| 19:30 – 21:30 | 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 **TBD**

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 | <b>Lifetime prediction of self-healing ceramic-matrix composites using a multi-physics image-based model</b><br>Guillaume Couégnat, CNRS, France |
| 16:30 – 17:00 | <b>Models for subcritical crack growth during static fatigue of SiC fiber in air and steam</b><br>Randall Hay, USAF/AFRL, USA                    |
| 17:00 – 18:00 | <b>Discussion</b>  |
| 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 – 14:00 Lunch

14:00 – 14:30 **Ceramic matrix composites for liner system of radioactive waste disposal cells**  
Emilie Perret, High Performance Multifunctional Materials Domain IRT Saint Exupéry, France

14:30 – 15:00 **From dental cement to damage tolerant CMCs**  
Erin Valenzuela, University of Birmingham, United Kingdom

**Session 6: Environmental Behavior**

Chair: TBD

15:00 – 15:30 **Synergistic degradation mechanisms of SiC/BN/SiC in oxidizing environments at intermediate temperatures under load**  
Elizabeth Opila, University of Virginia, USA



**Thursday, November 17, 2022 (continued)**

- |               |   |
|---------------|---|
| 15:30 – 16:00 | <b>Modeling environmental degradation in SiC/BN/SiC CMCs</b><br>Pavel Mogilevsky, UES Inc., USA   |
| 16:00 – 16:30 | <b>NASA Glenn high temperature EB-coated CVI SiC/SiC minicomposite testing and characterization</b><br>Douglas Kiser, NASA Glenn Research Center, USA |
| 16:30 – 17:00 | Coffee Break  |
| 17:00 – 18:00 | <b>Discussion</b><br>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 **TBD**

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