Program

Thermal and Environmental Barrier Coatings VII

June 22 – 27, 2025
Irsee, Germany

Conference Co-Chairs

Bruce Pint, Oak Ridge National Lab, USA, LEAD
Elizabeth Opila, University of Virginia, USA
Brian Hazel, Pratt & Whitney, USA
Uwe Schulz, DLR, Germany
Robert Vaßen, Research Center, Julich, Germany
Arturo Flores-Renteria, Siemens Energy, Germany
Bryan Harder, NASA, USA
Ram Darolia, GE Aerospace (Retired)

ECI Engineering Conferences International

Engineering Conferences International
369 Lexington Ave., Suite 389 - New York, NY 10017, USA
Phone: 1 - 212 - 514 - 6760
www.engconfintl.org – info@engconfintl.org

Kloster Irsee

Klosterring 4

D-87660 Irsee

Tel.: +49 (0)8341 906-00

hotel@kloster-irsee.de

Engineering Conferences International (ECI) is a not-for-profit global engineering conferences program, originally established in 1962, that provides opportunities for the exploration of problems and issues of concern to engineers and scientists from many disciplines.

Advisory Committee

Mike Maloney, PWA, (Retired)

Carlos Levi, UCSB, USA

Margeux Wallace, GE Research

Ravi Shankar Naraparaju, DLR, Germany

Gyn Brewster, Rolls Royce, UK

Previous conferences in this series

Thermal and Environmental Barrier Coatings
Aug 17-22, 2003
Irsee, Germany
Conference Chairs:
David R. Clarke, University of California Santa Barbara, USA
Anthony Evans, Princeton University, USA
Manfred Ruehle, MPI, Germany

Thermal Barrier Coatings II
August 12-17, 2007
Irsee, Germany
Conference Chairs:
Ram Darolia, GE Aviation, USA
Michael J. Maloney, Pratt & Whitney, USA
Kevin Hemker, Johns Hopkins University, USA
Christoph Leyens, Technical University of Brandenburg at Cottbus, Germany
Yutaka Kagawa, University of Tokyo, Japan

Thermal Barrier Coatings III
Aug. 7-12, 2011
Irsee, Germany
Conference Chairs:
Michael J. Maloney, Pratt & Whitney, USA
Uwe Schulz, German Aerospace Center, Germany
David Rickerby, Rolls-Royce, UK
Ram Darolia, GE Aviation, USA
Odile Lavigne, ONERA DMSM/MAT, France
Hideyuki Murakami, National Institute of Materials Science, Japan
Hongbo Guo, Beihang University, China

Thermal Barrier Coatings IV
June 22-27, 2014
Irsee, Germany
Conference Chairs:
Uwe Schulz, German Aerospace Center, Germany
Ram Darolia, GE Aviation, USA
Michael J. Maloney, Pratt & Whitney, USA

Thermal Barrier Coatings V
June 24 – 29, 2018
Irsee, Germany
Conference Chairs:
Robert Vaßen, Forschungszentrum Jülich GmbH, Germany
Brian Hazel, Pratt & Whitney, USA
Uwe Schulz, German Aerospace Center, Germany
Ram Darolia, GE Aviation, USA
Michael J. Maloney, Pratt & Whitney, USA

Previous conferences in this series

Thermal Barrier Coatings VI
June 19-24, 2022
Irsee, Germany
Conference Chairs:
Brian Hazel, Pratt & Whitney, USA
Dan Roth-Fagaraseanu, Rolls-Royce Deutschland, Germany
Robert Vaßen, Forschungszentrum Jülich GmbH, Germany
Uwe Schulz, German Aerospace Center, Germany
Michael J. Maloney, Pratt & Whitney, USA
Carlos G. Levi, University of California, Santa Barbara, USA
Ram Darolia, GE Aviation, USA

Conference Sponsors

DFG Deutsche Forschungsgemeinschaft

GE Aerospace

Sunday, June 22, 2025

16:00 – 18:00 Conference Check-In (Room 102)

18:00 – 21:30 Garden gathering including reception, BBQ dinner

Locations and Notes

- *Breakfasts and lunches will be in the Dining Room.*
- *Dinners and on Monday, Tuesday and Wednesday will be in the Bier Stube.*
- *The conference banquet will be in Room 228 (Ballroom).*
- *Poster Sessions will be in the corridor near the meeting room.*
- *Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, PDAs, watches) is strictly prohibited during the technical sessions, unless the author and ECI have granted prior permission.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 3-5 minutes for questions and discussion.*
- *Please do not smoke at any conference functions.*
- *Turn your mobile telephones to vibrate or off during technical sessions.*
- *After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.*
- *Emergency Contact Information: Because of privacy concerns, ECI does not collect or maintain emergency contact information for conference participants. If you would like to have this information available in case of emergency, please use the reverse side of your name badge.*

Monday, June 23, 2025

07:00 – 08:15	Breakfast
08:15 – 08:30	**Conference Overview & Welcome** Bruce Pint, ORNL, USA (retired) ECI welcome: Ram Darolia, GE Aviation, USA (retired)
	Session: Overview of TBC/EBC Application Chair: Margeaux Wallace, GE Aviation, USA
08:30 – 09:00	**Environmental barrier coatings: Bridging the gap from laboratory to engine** Gyn Brewster, Rolls-Royce Corporation, UK
09:00 – 09:30	**Air plasma spraying of thermal-environmental barrier coatings for future ceramic turbine components** Edward Gildersleeve, GE Aviation, USA
09:30 – 10:00	Coffee Break
10:00 – 10:30	**Manufacture and testing of advanced environmental barrier coatings** Robert Vaßen, Forchungszentrum Jülich GmbH, Germany
10:30 – 11:00	**GE Aerospace experience with environmental barrier coatings** Nate Brown, GE Aviation, USA
11:00 – 11:30	**Operation conditions of thermal barrier coatings for reliable stationary gas turbines** Arturo Flores Renteria, Siemens Energy AG, Germany
11:30 – 12:00	**Development and application of the advanced thermal barrier coating for 1650°C Class JAC Gas Turbine** Taiji Torigoe, Mitsubishi Heavy Industries, LTD, Japan
12:00 – 13:30	Lunch
	Session: New Concepts & Applications Chair: Mark Weaver, University of Alabama, USA
13:30 – 14:00	**Xenotime rare Earth orthophosphates as EBC candidate materials** Elizabeth Opila, University of Virginia, USA
14:00 – 14:30	**Interface design for multilayer, rare earth-rich thermal/environmental barrier coatings** David Poerschke, University of Minnesota, USA
14:30 – 15:00	**Environmental barrier coatings on silicon nitride combustors for reverse flow reactor applications** Charlie Chun, ExxonMobil Technology & Engineering Co., USA
15:00 – 15:30	Coffee Break
15:30 – 16:00	**Pushing the boundaries of YSZ TBCs and development of novel TBC systems for UHT application** Mario Rudolphi, DECHEMA, Germany
16:00 – 16:30	**Interpenetrating composite EBCs for oxygen-rich turbomachinery** Zach Cordero, Massachusetts Institute of Technology, USA

Monday, June 23, 2025 (continued)

16:30 – 17:00	**Influence of cationic parameters on phase formation and properties of high entropy zirconates** Maren Lepple, Justus Liebig University, Germany
17:00 – 18:00	**Discussion** Leader: Bryan Harder, NASA Glenn Research Center, USA
18:30 – 21:30	Dinner & Social Hour

Tuesday, June 24, 2025

07:00 – 08:30	Breakfast
	Session: CMAS Chair: Ravi Naraparaju, German Aerospace Center, Germany
08:30 – 09:00	**Complex interactions between silicate melts and thermal/environmental barrier coatings** Carlos Levi, University of California-Santa Barbara, USA
09:00 – 09:30	**Development of a CMAS resistant EBC for CMC** Takeshi Nakamura, IHI Corporation, Japan
09:30 – 10:00	Coffee Break
10:00 – 10:30	**Technologies to mitigate the CMAS concern** Jason Van Sluytman, Honeywell Aerospace, USA
10:30 – 11:00	**Degradation of various columnar thermal barrier coatings under thermal gradient cyclic testing with simultaneous CMAS attack** Daniel Mack, Forchungszentrum Jülich, Germany
11:00 – 11:30	**Understanding and modeling CMAS infiltration of a thermal barrier coating under thermal gradients** Thomas Brunet, ONERA, France
11:30 – 12:00	**Biomimetic super molten silicate phobicity of ceramic material** Wenjia Song, Beihang University, China
12:00 – 13:30	Lunch
	Session: Radiation Barriers Chair: Carlos Levi, University of California-Santa Barbara, USA
13:30 – 14:00	**Thermal radiation barrier coatings for gas turbines** David Clarke, Harvard University, USA
14:00 – 14:30	**Investigating the effect of increased TBC optical absorption in a lab-scale scramjet combustion facility** Ken Kane, Johns Hopkins University/Applied Physics Lab, USA
14:30 – 15:00	**Radiative versus conductive heat transfer through coatings** Georgios Koutsakis, University of New Mexico, USA
15:00 – 15:30	Coffee Break
15:30 – 16:00	**Universal trends in high temperature spectral emissivity of rare earth oxide-based materials for radiation barriers** Patrick Hopkins, University of Virginia, USA
16:00 – 17:00	**5-minute Student Poster Talks (TBD)**
17:00 – 18:00	**Discussion** Leader: Mike Maloney, retired, Pratt & Whitney, USA
18:00 – 19:30	Dinner
19:30 – 21:30	**Poster Session** & Social Hour

Wednesday, June 25, 2025

07:00 – 08:30	Breakfast
	Session: Coating Properties I Chair: Elizabeth Opila, University of Virginia, USA
08:30 – 09:00	**Combined environmental failure mechanisms and durability in EBCs** Bryan Harder, NASA Glenn Research Center, USA
09:00 – 09:30	**Microstructural and interfacial analysis of $Yb_2Si_2O_7$ based coatings under varied steam conditions** Daniel Scotson, University of Manchester, UK
09:30 – 10:00	Coffee Break
10:00 – 10:30	**Environmental barrier coated CMC behavior under individual and combinations of thermal, mechanical and physicochemical loadings** Thibaut Archer, ONERA, France
10:30 – 11:00	**Degradation & failure evaluation of EBCs under adverse operational environment: multi-physics modelling** Kuiying Chen, National Research Council, Canada
11:00 – 11:30	**Principle & applications for thermal history mapping on thermal & environmental barrier coated gas turbine components** Joseph Counte, Sensor Coating Systems Ltd., UK
11:30 – 12:00	**Discussion** Leader: Emine Bakan, Siemens Energy AG, Germany
12:00 – 13:30	Lunch
13:30 – 18:30	**Excursion** The group will promptly leave Kloster Irsee in coaches to Füssen for a two-hour scenic cruise on Lake Forggensee (the fourth largest lake in Bavaria). There will be panoramic views of the mountains surrounding the town as well as views of two of the castles, Neuschwanstein and Hohenschwangau, that the area is famous for. Snacks will be served. Return to Kloster Irsee by coaches.
18:30 – 21:30	Dinner & Social Hour

Thursday, June 26, 2025

07:00 – 08:30	Breakfast
	Session: Processing Chair: Arturo Flores Renteria, Siemens Energy AG
08:30 – 09:00	**Manufacturing science of layered, multifunctional coatings** Sanjay Sampath, Stonybrook University, USA
09:00 – 09:30	**Cold Plasma Spray (CPS): A new and industry-oriented process for advanced TBCs** Dominique Billieries, Saint-Gobain Coating Solutions, France
09:30 – 10:00	Coffee Break
10:00 – 10:30	**Environmental barrier coatings for SiC-SiC CMC components by Magnetron Sputtering and EB-PVD** Uwe Schulz, German Aerospace Center, Germany
10:30 – 11:00	**Oxidation resistant cathodic arc PVD MCrAlY coatings** Carmen Jerg, Oerlikon Surface Solutions AG, Liechtenstein
11:00 – 11:30	**Impact of process on EBC coating performance** Lisa Pin, Safran, France
11:30 – 12:00	**Colloidal behavior of rare earth disilicate suspensions** Glen Kirby, General Electric Aerospace, USA
12:00 – 13:30	Lunch
	Session: Coating Properties II Chair: Robert Vaßen, Forchungszentrum Jülich GmbH, Germany
13:30 – 14:00	**Sensitivity of TBC to thermo-mechanical fatigue loading including through thickness gradient (TGMF)** Vincent Maurel, Mines Paris PSL University, France
14:00 – 14:30	**Lifetime assessment of TBCs: On the evolution of ONERA's energetic approach under thermal gradient conditions** Matthieu Nicol, ONERA, France
14:30 – 15:00	**Experimental testing and characterization of materials at extreme temperatures at and above 2,000°C** Kevin Hemker, Johns Hopkins University, USA
15:00 – 15:30	Coffee Break
15:30 – 16:00	**Raman and photoluminescence spectroscopic condition monitoring of high temperature protective coatings** Ashutosh Gandhi, IIT Bombay, India
16:00 – 17:00	**Discussion** Leader: Bryan Harder, NASA Glenn Research Center, USA
17:00 – 17:30	**Plenary Talk: Materials research strategy to support low-carbon fuels and the energy transition** Alex Bridges, Electric Power Research Institute, USA

Thursday, June 26, 2025 (continued)

19:30 – 20:00	Reception
20:00 – 22:00	Conference Banquet

Friday, June 27, 2025

07:00 – 08:30	Breakfast
	Session: Hydrogen & Refractory Alloys Chair: Uwe Schulz, German Aerospace Center
08:30 – 09:00	**Optimized microstructures for improved TBC sintering resistance for use with hydrogen fuels** Margeaux Wallace, General Electric Aviation, USA
09:00 – 09:30	**High temperature oxidation behavior of TBC coated Ni-based super alloys under hydrogen combustion atmospheres** Ravi Naraparaju, German Aerospace Center, Germany
09:30 – 10:00	Coffee Break
10:00 – 10:30	**TBA**
10:30 – 11:00	**TBA**
11:00 – 12:00	**Discussion** Leader: Bruce Pint, retired, Oak Ridge National Laboratory, USA
12:00 – 13:30	Lunch
13:30	Departures

List of Posters

1. **EB-PVD coating by Von Ardenne**
   Robert Ostanin, Von Ardenne, Germany

2. **Investigation of residual strains in Environmental Barrier Coatings using Neutron Bragg Edge Radiography UK ISIS Neutron Facility**
   Shivansh Nauriyal, University of Oxford, UK

3. **From single- to multicomponent system: CMAS corrosion of rare-earth zirconates**
   Jonas Johannes Pflug, Justus Liebig University Giessen, Germany

4. **High-entropy oxides as new thermal barrier coatings: First investigations of their potential**
   Manuel Schenker, Justus Liebig University Giessen, Germany

5. **ZrO_2-HfO_2-Y_2O_3-Ta_2O_5 system: Thermodynamic investigations of a promising materials system for thermal barrier coating applications**
   Alina Habermann, Justus Liebig University Giessen, Germany

6. **High-entropy oxides: crystal structures and thermophysico-chemical properties of promising thermal barrier coating materials**
   Giulia Bianchi, Justus Liebig University Giessen, Germany

7. **Tweaking CMAS wettability by laser-induced surface modifications of thermal barrier coatings**
   Emilie Lam, Université de Limoges, France

8. **Influence of cation size on Calcium-Magnesium-Aluminosilicate interactions with binary rare Earth disilicate coatings**
   Laura Doumaux, University of Virginia, USA

9. **Characterization and CMAS corrosion resistance of YbMS and YbDS multilayered EBCs**
   Margherita Cescon, Università di Modena e Reggio Emilia, Italy

10. **Key components for combined electron beam and plasma T/EBC processes**
    Burkhard Zimmermann, Fraunhofer Institute for Electron Beam and Plasma Technology FEP, Germany

11. **Investigation of SPS YSZ TBC with Pt rich γ/γ' bondcoats using Laser Shock Adhesion Test (LASAT)**
    Eliott Degouilles, MINES PARIS -PSL, Centre des Matériaux, France

12. **Molten silicate interactions with YAG-YAP thermal/environmental barrier coatings**
    Scott Berens, University of California, Santa Barbara, USA

13. **Crystal structure changes during production of ytterbium disilicate for EBCs**
    Andres Carrasco, Treibacher Industrie AG, Austria

14. **Development of novel multicomponent materials as ultrahigh temperature thermal barrier materials**
    Sairam Ramachandran, Indian Institute of Technology Bombay, India

15. **The effects of chemistry and microstructure on the high-temperature capabilities of a refractory complex concentrated alloy**
    Mark Weaver, The University of Alabama, USA

16. **Mechanical and microstructural characterization of 7YSZ TBC**
    Matthew Engquist, Johns Hopkins University, USA

17. **Collapse characteristics and deposition behaviour of PS–PVD powders with different crushing strengths**
    Li-kang Liang, Functional Coating and Equipment Technology Institute, Chinese Academy of Agricultural Mechanization Sciences Group Co. Ltd., China

18. **Failure testing of monolithic and multi-layered TBC systems**
    Aidan Donnelly, Center for Thermal Spray Research, Stony Brook University, USA

19. **Testing of thermal and environmental coatings under water vapor**
    Sara Catalina Pineda Heresi, Forschungszentrum Jülich, Germany

20. **High resolution structural and compositional characterization of a Thermal Barrier Coating**
    Prerna Sudera, Thermo Fisher Scientific, the Netherlands

21. **Coupling microstructure and stress evolution of steam oxidised EBCs**
    Daniel Scotson, University of Manchester, UK

22. **Effect of microstructure on thermal cycling and CMAS corrosion behavior of $(Gd_{0.9}Yb_{0.1})_2Zr_2O_7$/YSZ thermal barrier coatings prepared by EB-PVD**
    Chengyang Jiang, Beihang University, China

23. **Investigating thermal and optical properties in rare earth zirconates for radiative barrier coatings**
    William Riffe, University of Virginia, USA

24. **Revolutionizing thermal barrier coating processes: laser cleaning for enhanced substrate preparation and tbc removal**
    Dmitri Novikov, IPG Photonics, USA

25. **Characterisation of the damage mechanisms of a thin YbDS EBC for CMC applications: from standard tests to conditions close to the engine environment**
    Louane Ronteix, Institut PPRIME, SAFRAN Ceramics France

26. **The impact of YSZ powder morphology on Segmented-TBC single and multilayer systems**
    Alessandro Lanzi, Lincotek Surface Solution, Italy

27. **Plasma assistance for enhanced microstructures of EB-PVD coatings**
    Thorsten Hohmann, ALD Vacuum Technologies GmbH, Germany

28. **Collapse characteristics and deposition behaviour of PS–PVD powders with different crushing strengths**
    Yusheng Zhang, Functional Coating and Equipment Technology Institute, Chinese Academy of Agricultural Mechanization Sciences Group Co. Ltd., China

29. **High temperature oxidation of diffusion Pt-γ/γ' and Pt-aluminide coatings at 1200 °C**
    Radosław Swadźba, Łukasiewicz Research Network – Uppersilesian Institute of Technology, Poland

30. **CMAS infiltration measurement method (CIMM)**
    Koldo Almandoz Forcen, Cranfield University, UK

31. **Development of Environmental Barrier Coatings via Pvd techniques: Evaluation under High Temperature Water Vapor**
    Cynthia Yanel Guijosa Garcia, DLR, Germany

32. **Laser shock for damage monitoring in Thermal Barrier Coatings applied to laser rig**
    Alice Dolmaire, ONERA, France

33. **Development of an EBC for hydrogen combustion aeronautical engines**
    Adeba Charles Ezanin, ONERA, France