

# Engineering Conferences International ECI Digital Archives

---

Ultra-High Temperature Ceramics: Materials For  
Extreme Environmental Applications II

Proceedings

---

Spring 5-14-2012

## Program

Engineering Conferences International

Follow this and additional works at: <http://dc.engconfintl.org/uhtc>



Part of the [Materials Science and Engineering Commons](#)

---

### Recommended Citation

Engineering Conferences International, "Program" in "Ultra-High Temperature Ceramics: Materials For Extreme Environmental Applications II", W. Fahrenholtz, Missouri Univ. of Science & Technology; W. Lee, Imperial College London; E.J. Wuchina, Naval Service Warfare Center; Y. Zhou, Aerospace Research Institute Eds, ECI Symposium Series, (2013). <http://dc.engconfintl.org/uhtc/1>

This Conference Proceeding is brought to you for free and open access by the Proceedings at ECI Digital Archives. It has been accepted for inclusion in Ultra-High Temperature Ceramics: Materials For Extreme Environmental Applications II by an authorized administrator of ECI Digital Archives. For more information, please contact [franco@bepress.com](mailto:franco@bepress.com).

## *Program*

# **Ultra-High Temperature Ceramics: *Materials for Extreme Environment Applications II***

May 13 - 18, 2012

Schloss Hernstein  
Hernstein, Austria

### Conference Chairs:

***Bill Fahrenholtz***

Missouri University of Science & Technology

***Bill Lee***

Imperial College, London

***Eric Wuchina***

Naval Surface Warfare Center

***Yanchun Zhou***

Aerospace Research Institute of Materials and Processing Technology



**Engineering Conferences International**

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

Phone: 1 - 212 - 514 - 6760, Fax: 1 - 212 - 514 - 6030

[www.engconfintl.org](http://www.engconfintl.org) – [info@engconfintl.org](mailto:info@engconfintl.org)

Schloss Hernstein  
Berndorfer Straße 32  
A-2560 Hernstein  
Austria  
Tel: +43 (0)2633 47 251

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.

#### ECI BOARD MEMBERS

Barry C. Buckland, President  
Peter Gray  
Michael King  
Raymond McCabe  
David Robinson  
William Sachs  
Eugene Schaefer  
P. Somasundaran  
Deborah Wiley

Chair of ECI Conferences Committee: William Sachs

ECI Technical Liaison for this conference: Linn Hobbs

ECI Executive Director: Barbara K. Hickernell

ECI Associate Director: Kevin M. Korpics

*In Memoriam*

**Jules Routbort**

1937-2012

Vice President – ECI Board of Directors

Former Chair – ECI Conferences Committee

Technical Liaison for more than 30 conferences



Conference Sponsors

We wish to thank the following for their contribution to the success of this conference: European Office of Aerospace Research and Development, Air Force Office of Scientific Research, United States Air Force Research Laboratory (<http://www.london.af.mil>)



Office of Naval Research Global



## **Sunday, May 13, 2012**

17:00 – 18:00	Conference Check-in (Schloss Hernstein Lobby)
18:00 – 19:00	Opening Reception (Historic area)
19:00 – 20:30	Dinner (Schloss Restaurant)
20:30 – 21:30	Reception (Hotel Bar)

### **NOTES**

- *Technical sessions will be held in Hofsuite 1-2*
- *Coffee breaks will be in the cafeteria (in front of the conference room)*
- *Audiotaping, videotaping and photography of presentations are prohibited.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 5 minutes for questions and discussion.*
- *Please do not smoke at any conference functions.*
- *Turn your mobile phones to vibrate or off during technical sessions.*

## Monday, May 14, 2012

07:30 – 09:00 Breakfast

09:00 – 09:15 Opening Remarks  
Conference Chairs  
ECI Technical Liaison

### SESSION I: CHALLENGES AND OPPORTUNITIES

09:15 – 9:45 **Ultra-High Temperature Ceramics: Historic Perspectives and Recent Progress**

Bill Fahrenholtz, Missouri University of Science and Technology, USA

9:45 – 10:15 **The Next Steps for Ultra-High Temperature Ceramics**

Eric Wuchina, Naval Surface Warfare Center, USA

10:15 – 10:45 Coffee Break

10:45 – 11:15 **Invited  
Nuclear applications for UHTCs**

Dan Riley, Australian Nuclear Science and Technology Organization, Australia

11:15 – 11:45 **Processing and behavior of UHTCs for aerospace applications**

Michael Cinibulk, Air Force Research Laboratory, USA

11:45 – 12:30 **Poster Preview Presentations, Part 1 (Posters 1-8)**

*Three slides and three minutes for each poster presenter to introduce their poster*

12:30 – 13:30 Lunch

13:30 – 15:30 Free time for recreation, *ad hoc* discussions

15:30 – 16:00 Afternoon Coffee

### SESSION II: COMPOSITES AND CARBIDES

16:30 – 17:00 **Invited  
Microstructure formation pathways and deformation mechanisms in tantalum carbides**

Gregory Thompson, University of Alabama, USA

17:00 – 17:20 **High temperature creep behavior of B<sub>4</sub>C polycrystals prepared by spark plasma sintering**

Bibi Malmal Moshtaghion, University of Seville, Spain and Isfahan Institute of Technology, Iran

17:20 – 17:40 **Carbon fiber reinforced UHTC matrix composites**

Shaoming Dong, Shanghai Institute of Ceramics, CAS, China

17:40 – 18:00 **Fabrication, properties, and arc-jet testing of ZrB<sub>2</sub>-based composites  
Containing short SiC fibers**

Frederic Monteverde, ISTEC-CNR, Italy



**Monday, May 14, 2012 (continued)**

- |               |   |
|---------------|---|
| 18:00 – 18:20 | <b>SiC/SiC ceramic matrix composites: A turbine engine perspective</b><br>Adam Chamberlain, Rolls-Royce Corporation, USA  |
| 18:20 – 18:40 | <b>In-situ imaging and strain determination during fracture in a SiC/SiC ceramic matrix composite</b><br>Joaquin Ramirez Rico, Universidad de Sevilla - CSIC, Spain |
| 19:00 – 20:30 | Dinner  |
| 20:30 – 22:00 | Wine Tasting  |

**Tuesday, May 15, 2012**

07:30 – 09:00 Breakfast

**SESSION III: SYNTHESIS AND PROCESSING**

09:00 – 09:30

**Invited**  
**Sintering and densification of UHTCs**  
Diletta Sciti, ISTECCNR, Italy

09:30 – 09:50

**Towards complex shape manufacture of UHTCs by colloidal processing**  
Carolina Tallon, The University of Melbourne, Australia

09:50 – 10:10

**Advanced fabrication of UHTC composites with polymer precursors**  
JunPing Li, Aerospace Research Institute, China

10:10 – 10:40

Coffee Break

10:40 – 11:10

**Low temperature synthesis and sintering of mechanically activated ZrB<sub>2</sub> powders**  
Mustafa Tuncer, Dumlupinar University, Turkey

11:10 – 11:30

**ZrB<sub>2</sub>-ZrC-SiC foam from zirconoborosiloxane oligomer**  
B. Swaminathan, Vikram Sarabhai Space Center, India

11:30 – 12:40

**Poster Preview Presentations, Part 2 (Posters 9-18)**  
*Three slides and three minutes for each poster presenter to introduce their poster*

12:45 – 13:45

Lunch

13:45 – 16:00

Free Time for recreation, *ad hoc* discussions

16:00 – 16:30

Afternoon Coffee

**SESSION IV: PROCESSING AND JOINING**

16:30 – 17:00

**Invited**  
**Ultra-high temperature ceramics: Advanced processing methods and properties**  
Erica Corral, The University of Arizona, USA

17:00 – 17:30

**Invited**  
**UHTC composites for ultra-high temperature applications**  
Jon Binner, Loughborough University, United Kingdom

17:30 – 17:50

**Joining of ultra-high temperature ceramics**  
Laura Silvestroni, CNR-ISTEC, Italy

17:50 – 18:10

**Solid state diffusion bonding of ZrC to Zr-based alloys**  
Andrew Gillen, Institute of Materials Engineering, ANSTO, Australia

18:10 – 18:30

**Fusion Welding of ZrB<sub>2</sub>-based Ceramics**  
William Fahrenholtz, Missouri University of Science and Technology, USA

**Tuesday, May 15, 2012 (continued)**

- |               |   |
|---------------|---|
| 18:30 – 18:50 | <b>Combination of RMI and SPS routes for fabrication of fully dense ZrB<sub>2</sub>-ZRC composites</b><br>Song Wang, National University of Defense Technology, China |
| 19:00 – 20:30 | Dinner  |
| 20:30 – 22:00 | Poster Session with social hour   |

**Wednesday, May 16, 2012**

07:30 – 09:00 Breakfast

**SESSION V: TESTING AND OXIDATION**

09:00 – 09:45 **Keynote**  
**UHTC-based hot structures for space re-entry: lesson learned and future perspectives**  
Luigi Scatteia, CIRA - Italian Aerospace Research Centre, Italy

09:45 – 10:15 **Invited**  
**Modeling extreme environment response of UHTCs**  
T.A. Parthasarathy, Air Force Research Laboratory/UES Inc., USA

10:15 – 10:35 **Structural evolution during oxidation and its effect on strength of UHTCs**  
Doni Daniel Jayaseelan, Imperial College London, UK

10:35 – 11:05 Coffee break

11:05 – 11:35 **A cost effective screening technique of UHTC materials using an Oxy-acetylene torch flame**  
Anish Paul, Loughborough University, United Kingdom

11:35 – 11:55 **Oxidation behavior of ZrB<sub>2</sub>-SiC-TaC ceramics**  
Yiguang Wang, Northwestern Polytechnical University, China

12:15 Boxed lunches

12:30 – 18:30 Depart for afternoon excursion to Vienna. Time to spend the afternoon discovering this beautiful city on your own with a provided map or to see the city on a Hop-On, Hop-Off bus tour. (Bus tour paid directly to company.)

19:00 Dinner

20:30 – 22:00 Poster Session with social hour

**Thursday, May 17, 2012**

07:30 – 09:00 Breakfast

**SESSION VI: PROPERTIES AND CHARACTERIZATION**

09:00 – 09:30 **Invited**  
**Ultra-high temperature thermal and mechanical properties of ZrB<sub>2</sub>-based ceramics**  
Greg Hilmas, Missouri University of Science and Technology, USA

09:30 – 09:50 **High temperature mechanical properties of zirconium diboride**  
Luc Vandeperre, Imperial College London, United Kingdom

09:50 – 10:10 **High temperature physical and mechanical properties improvement in ZrB<sub>2</sub>-SiC ceramics: Benefits from high purity ZrB<sub>2</sub> powders and transition metal carbide additions**  
Ji Zou, Katholieke Universiteit Leuven, Belgium

10:10 – 10:40 **Invited**  
**High temperature mechanical, oxidation and shock resistance properties of hot pressed and spark plasma sintered TiB<sub>2</sub>-based ceramics**  
Bikramjit Basu, Indian Institute of Science, India

10:40 – 11:10 Coffee break

11:10 – 11:40 **Invited**  
**Textured diboride based UHTCs with anisotropic properties**  
Guo-Jun Zhang, Shanghai Institute of Ceramics, China

11:40 – 12:00 **Powder synthesis, consolidation and mechanical characteristics of amorphous ultra-high temperature ceramics**  
Hiroshi Kimura, National Defense Academy, Japan

12:00 – 12:20 **Microstructures and thermal conductivities of hot-pressed ZrB<sub>2</sub>-SiC ceramics with a variety of SiC sources**  
Seongwon Kim, Korea Institute of Ceramic Engineering and Technology, Korea

12:20 – 13:20 Lunch

13:20 – 16:00 Free time for recreation, *ad hoc* discussions

16:00 – 16:30 Afternoon Coffee

**SESSION VII: CHARACTERIZATION**

16:30 – 17:00 **Invited**  
**Advanced characterization of composite ultra high temperature ceramic systems**  
W.E. Lee, Imperial College London, United Kingdom

17:00 – 17:20 **Where we are with the understanding of metal/ceramic interactions: The case of transition metal borides**  
Alberto Passerone, IENI-CNR, Italy

**Thursday, May 17, 2012 (continued)**

- 17:20 – 17:50      **Microstructure characterization of UHTCs using high resolution TEM**  
Yanchun Zhou, Aerospace Research Institute of Materials and Processing  
Technology, China
- 17:50 – 18:20      **Invited**  
**Advanced high-temperature material testing in an ICP torch facility**  
Doug Fletcher, University of Vermont, USA
- 18:20 – 18:40      **Using the consolidated nanomaterials-based high-melting compounds for  
extreme environmental applications**  
Rostislav Andrievski, Institute of Problems of Chemical Physics, RAS, Russia
- 19:00                Conference Dinner followed by social hour

**Friday, May 18, 2012**

07:30 – 08:80 Breakfast

**Wrap-Up Session:**

08:30 – Noon **Informal discussions for post-conference publications and planning for next meeting**

12:30 Lunch (or boxed lunch) and return to Vienna Airport

## Poster Presentations

- 1. Materials design of FG-UHTC based on “Ridge-Effect” phenomenon**  
Igor L. Shabalin, The University of Salford, United Kingdom
- 2. Thermal shock properties of 2D C/SiC prepared by chemical vapor infiltration**  
Chengyu Zhang, Science and Technology on Thermostructural Composite Materials Laboratory, China
- 3. Processing of ZrB<sub>2</sub> and HfB<sub>2</sub> based ultra high temperature ceramics**  
J. Sonber, Materials Group, India
- 4. Microstructure and mechanical properties of ZrB<sub>2</sub>-Nb composites**  
Sun Xin, Aerospace Research Institute of Materials and Processing Technology, China
- 5. First principles investigation of chemical bonding and elastic modulus of UHTCs**  
Junshan Wang, Aerospace Research Institute of Materials and Processing Technology, China
- 6. Interfacial coatings on carbon fibers**  
Natalia Baklanova, Institute of Solid State Chemistry and Mechanochemistry, RAS, Russia
- 7. Solid solution behavior in transition metal carbides**  
Maryam Nojabaee, Iran University of Science and Technology, Iran
- 8. Fabrication of TaC-HfC ceramics for ultra-high temperature applications**  
Omar Cedillos-Barraza, Imperial College London, United Kingdom
- 9. Densification and high temperature mechanical properties of TiB<sub>2</sub> and ZrB<sub>2</sub>-based composites**  
Neha Gupta, Indian Institute of technology Kanpur (IITK), India
- 10. Effects of carbon on the processing and thermal properties of hot pressed ZrB<sub>2</sub>**  
Greg Harrington, Missouri University of Science and Technology, USA
- 11. HfB<sub>2</sub> powders via sol-gel processing**  
Saranya Venugopal, Loughborough University, United Kingdom
- 12. Ultra high temperature ceramics (UHTCs) for aerospace applications**  
Pengxiang Zheng, Loughborough University, United Kingdom
- 13. Elevated temperature deformation mechanisms in Ta<sub>2</sub>C**  
Nicholas De Leon, The University of Alabama, USA
- 14. Microstructure, tribological response, and mechanical properties of fiber bonded silicon carbide ceramics**  
M. C. Vera, Universidad de Sevilla-CSIC, Spain
- 15. Ultra high temperature mechanical testing methodology of ZrB<sub>2</sub> based ceramics**  
Eric W. Neuman, Missouri University of Science and Technology, USA
- 16. Low-temperature MOCVD process for deposition of IR- and HF-containing refractory films**  
Natalia B. Morozova, Nikolaev Institute of Inorganic Chemistry SB RAS, Russia
- 17. Characterization of mechanically activated zirconium diboride (ZrB<sub>2</sub>) powders**  
Mustafa Tuncer, Dumlupinar University, Turkey