

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.

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 – 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 B₄C 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 ZrB₂-based composites
Containing short SiC fibers**

Frederic Monteverde, ISTEC-CNR, Italy

Monday, May 14, 2012 (continued)

- | | |
|---------------|---|
| 18:00 – 18:20 | SiC/SiC ceramic matrix composites: A turbine engine perspective
Adam Chamberlain, Rolls-Royce Corporation, USA |
| 18:20 – 18:40 | In-situ imaging and strain determination during fracture in a SiC/SiC ceramic matrix composite
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 ZrB₂ powders
Mustafa Tuncer, Dumlupinar University, Turkey

11:10 – 11:30

ZrB₂-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 ZrB₂-based Ceramics
William Fahrenholtz, Missouri University of Science and Technology, USA

Tuesday, May 15, 2012 (continued)

- | | |
|---------------|---|
| 18:30 – 18:50 | Combination of RMI and SPS routes for fabrication of fully dense ZrB₂-ZRC composites
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 ZrB₂-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 ZrB₂-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 ZrB₂-SiC ceramics: Benefits from high purity ZrB₂ 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 TiB₂-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 ZrB₂-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 ZrB₂ and HfB₂ based ultra high temperature ceramics**
J. Sonber, Materials Group, India
- 4. Microstructure and mechanical properties of ZrB₂-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 TiB₂ and ZrB₂-based composites**
Neha Gupta, Indian Institute of technology Kanpur (IITK), India
- 10. Effects of carbon on the processing and thermal properties of hot pressed ZrB₂**
Greg Harrington, Missouri University of Science and Technology, USA
- 11. HfB₂ 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 Ta₂C**
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 ZrB₂ 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 (ZrB₂) powders**
Mustafa Tuncer, Dumlupinar University, Turkey