

Ultra-High Temperature Ceramics: Materials for Extreme Environment Applications III 2015

Gold Coast, Australia
12 – 16 April 2015

Editors:

**G. Franks
C. Tallon**

ISBN: 978-1-5108-1208-6

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2015) by Engineering Conferences International
All rights reserved.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact Engineering Conferences International
at the address below.

Engineering Conferences International
32 Broadway, Suite 314
New York, NY 10004
USA

Phone: (212) 514-6760
Fax: (212) 514-6030

info@engconfintl.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

Monday, April 13, 2015

Breakfast (Deja View Restaurant): Opens 06:30

09:00 - 09:20

Opening Remarks (Carolina Tallon, Chair; Ram Darolia, ECI Liaison)

Session Chair: Carolina Tallon, The University of Melbourne, Australia

Plenary 1

09:20 - 10:20

Sustained Hypersonic Flight – It's harder than Rocket Science 1
Michael Smart, The University of Queensland, Australia

10:20 - 10:50

Coffee break

Session 1: Synthesis and Processing

Session Chair: Laura Silvestroni, National Research Council of Italy, Italy

10:50 - 11:10

Properties of HfC-SiC nano composites prepared using reactive spark plasma sintering N/A
Sea Hoon Lee, Korea Institute of Materials Science, South Korea

11:10 - 11:30

Processing and Characterisation of (Ta,Hf)C Ultra-High Temperature Ceramics 15
William E. Lee, Imperial College London, United Kingdom

11:30 - 11:50

Synthesis and Static Oxidation Testing of Doped HfB₂ Powders 33
Jon Binner, University of Birmingham, United Kingdom

11:50 - 12:20

Session 1 Discussion

12:20 - 13:30

Lunch

13:30 - 15:00

Free time/ad hoc discussion

Session 2: Characterization

Session Chair: William E. Lee, Imperial College London, United Kingdom

15:00 - 15:40

Keynote 1
Ultra-High Temperature Mechanical Properties of Zirconium Diboride-Based Ceramics 43
William Fahrenholtz, Missouri University of Science and Technology, USA

15:40 - 16:10

Coffee break

16:10 - 16:30

Invited 1
UHTC Development: Impact of Modern Characterisation Techniques N/A
Daniel Riley, Institute of Materials Engineering, ANSTO, Australia

16:30 - 16:50

A Diffusion-Based Oxidation and Multi Crack Growth Model to Predict Damage in Ultra-High Temperature Ceramics N/A
Michele Pettina', Imperial College London, United Kingdom

Monday, April 13, 2015 (continued)

16:50 - 17:10	High Temperature Ablation Rig Testing (HiTAR) N/A Sam Moricca, Australian Nuclear Science and Technology Organisation, Defence Materials Technology Centre, Australia
17:10 - 17:30	Session 2 Discussion
18:00 - 20:00	Dinner
20:00 - 21:00	Poster Session/Social Hour

Tuesday, April 14, 2015

Breakfast (Deja View Restaurant): Opens 06:30

Session 3: Barriers/Coatings/Porous

Session Chair: Eric Wuchina, Naval Surface Warfare Center, USA

09:20 - 10:00

Keynote 2

Boride-carbide Systems: From UHTCs to CMCs N/A

Carlos G. Levi, UCSB, USA

10:00 - 10:20

Characterization of Ultra High Temperature Ceramic Coatings Deposited by Vacuum Plasma Spraying 55

Yeon Woo Yoo, Korea Institute of Materials Science, South Korea

10:20 - 10:50

Coffee break

10:50 - 11:10

New Thermal Barrier Coatings for Advanced Turbine Engines N/A

Hongbo Guo, Beihang University, China

11:10 - 11:30

The Effect of Substrate Geometry Variations on the Formation and Topographical Properties of Plasma Sprayed Thermal Barrier Coatings N/A

Mitchell L. Sesso, Swinburne University of Technology, Australia

11:30 - 11:50

Orientation and Stress Relationship between Thermally Grown Rutile and Alumina formed during High Temperature Oxidation N/A

Robbie J. Bennett, Cambridge University, United Kingdom

11:50 - 12:10

Near-Net-Shaping and Microstructure-Properties Modelling of Multi-Scale Porous UHTC N/A

Carolina Tallon, The University of Melbourne, Australia

12:10 - 12:30

Session 3 Discussion

12:30 - 13:30

Lunch

13:30 - 15:30

Free time/ad hoc discussion

Session 4: Phase Stability

Session Chair: Noritaka Saito, Kyushu University, Japan

15:30 - 16:10

Keynote 3

Metal-rich Ceramic Phase Stability and Microstructures in Group IV and V Carbides and Nitrides N/A

Gregory B. Thompson, University of Alabama, USA

16:10 - 16:40

Coffee break

16:40 - 17:00

Phase diagrams in the system boron-carbon-hafnium-zirconium N/A

Theresa Davey, Imperial College London, United Kingdom

17:00 - 17:20

In situ, high temperature, synchrotron studies on the oxidation of ZrB₂ and composites N/A

Pankaj Sarin, Oklahoma State University, USA

Tuesday, April 14, 2015 (continued)

17:20 - 17:40	Slip Regulation in Rocksalt Transition Metal Carbides	N/A
	Nicholas DeLeon, The University of Alabama, USA	
17:40 - 18:00	Session 4 Discussion	
18:00	Dinner on own	

Wednesday, April 15, 2015

Breakfast (Deja View Restaurant): Opens 06:30

Session 5: Fibers/Composites

Session Chair: Jon Binner, University of Birmingham, United Kingdom

09:00 - 10:00

Plenary 2

UHTCMCs: short vs continuous fibers N/A

Laura Silvestroni, National Research Council of Italy, CNR-ISTEC, Italy

10:00 - 10:20

Application of Coatings for Fiber Protection in ZrB₂ Based UHTCMC Structures for Hypersonic Flight N/A

Marius Nelson Kuetemeyer, DLR, Germany

10:20 - 10:40

Development and Environment Relevant Testing of Ultra High Temperature Ceramic Matrix Composites based on Airbus Group C/SiC "SICARBON(TM)" N/A

Stephan Schmidt-Wimmer, Airbus Defence & Space, Germany

10:40 - 11:10

Coffee break

Session Chair: William Fahrenholtz, Missouri University of Science and Technology, USA

11:10 - 11:30

An oxidation kinetic analysis of hot pressed zirconium carbide at high temperature 66

Claudia Gasparrini, Imperial College London, United Kingdom

11:30 - 12:10

Keynote 4

UHTC Composites: Processing, Performance and Future 75

Jon Binner, University of Birmingham, United Kingdom

12:10 - 12:30

Session 5 Discussion

12:30 - 19:00

Box Lunch/Optional Excursion/Free Time

19:00 – 22:00

Conference Banquet

Dinner Speaker

Mark Hodges, Defence Materials Technology Centre (DMTC), Australia

Thursday, April 16, 2015

Breakfast (Deja View Restaurant): Opens 06:30

Session 6: Joining

Session Chair: Gregory Thompson, University of Alabama, USA

09:00 - 09:40

Keynote 5

Joining of UHTC Boride Composites using Metallic Interlayer 95

Noritaka Saito, Kyushu University, Japan

09:40 - 10:00

Effect of Ni-Nb Interlayer Thickness on Mechanical Property of HfB₂ Composite Joints 122

Kou Honda, Kyushu University, Japan

10:00 - 10:20

Session 6 Discussion

10:20 - 10:50

Coffee break

10:50 - 11:50

Wrap-up and planning

11:50

Box lunch and departures

Poster Presentations List N/A

Poster Session Monday, 13 April, 2015, 20.00-21.00

1. **Application of spark plasma sintering for the synthesis of nano UHTC powders**
Sea Hoon Lee, Korea Institute of Materials Science, South Korea
2. **Analysis of polycarbosilane precursors for the precursor impregnation and pyrolysis process**
Sea Hoon Lee, Korea Institute of Materials Science, South Korea
3. **Plasticity mechanisms in hafnium nitride at room and elevated temperature**
Katherine Vinson, The University of Alabama, USA
4. **The effect mechanism of photon radiation on the heat insulation performance in ceramic thermal barrier coating at elevated temperature**
Yue Ma, Beihang University, China
5. **A pressureless sintering process for preparing ultra-high temperature ZrB₂-SiC ceramics**
Qi Li, Beijing Institute of Aeronautical Materials, China
6. **Thermal transport properties of InFeZnO₄-YbFeZnO₄ solid solutions**
Yanling Pei, Beihang University, China