42nd Annual Conference on Composites, Materials, and Structures

ITAR Restricted Sessions
U.S. Citizens and U.S. Permanent Residents

Final Program

January 22-25, 2018
Radisson Resort at the Port
Cocoa Beach / Cape Canaveral, FL

www.advancedceramics.org/CMS2018

*No Photographs Permitted*
# Program at a Glance

**Sunday Evening, January 21, 2018**

6:00-9:00pm  Pre-Registration (Convention Center Lobby)
Complimentary Refreshments

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<th>Monday, January 22, 2018</th>
<th>Tuesday, January 23, 2018</th>
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<td><strong>Morning Session</strong></td>
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<tr>
<td>8:30-12:00</td>
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<tr>
<td>Plenary Session</td>
<td>Session 1: Ceramic Matrix Composites 2 (Salons 1 &amp; 2)</td>
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<tr>
<td>(Salons 1 &amp; 2)</td>
<td>8:30-11:00</td>
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<td></td>
<td>Session 2: Carbon-Carbon Composites Materials 2 (Jamaica off hotel lobby)</td>
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<tr>
<td><strong>Afternoon Sessions</strong></td>
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<td>1:30-5:00</td>
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<tr>
<td>Session 1: Ceramic Matrix Composites 1 (Salons 1 &amp; 2)</td>
<td>Session 1: Ceramic Matrix Composites 3 (Salons 1 &amp; 2)</td>
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<tr>
<td>1:30-4:40</td>
<td>1:30-5:20</td>
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<tr>
<td>Session 2: Carbon-Carbon Composites Materials 1 (Jamaica off hotel lobby)</td>
<td>Session 2: Thermal Protection Systems 1 (Jamaica off hotel lobby)</td>
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<tr>
<td><strong>Afternoon/Evening Activities (Pavilion)</strong></td>
<td><strong>Evening Activities (Pavilion)</strong></td>
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<tr>
<td>12:00-1:30</td>
<td>5:00-7:00</td>
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<tr>
<td>Exhibitor Set-up</td>
<td>ITAR Restricted Expo and Networking Social</td>
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<tr>
<td>5:00-7:00</td>
<td>7:30-8:30</td>
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<td>ITAR Restricted Expo and Networking Social</td>
<td>Exhibitor Breakdown</td>
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<tr>
<th>Wednesday, January 24, 2018</th>
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<tr>
<td><strong>Morning Sessions</strong></td>
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<tr>
<td>8:15-12:00</td>
<td>8:15-11:40</td>
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<tr>
<td>Session 1: Behavior and Life of Ceramic Matrix Composites 1 (Salon 1)</td>
<td>Session 1: Behavior and Life of Ceramic Matrix Composites 3 (Salon 1)</td>
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<td>8:30-11:40</td>
<td>8:30-12:00</td>
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<tr>
<td>Session 2: Extreme Environment Materials 1 - New Materials Development (Salon 2)</td>
<td>Session 2: Hypersonic Structural Evaluations 1 (Salon 2)</td>
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<tr>
<td>8:30-11:40</td>
<td>8:30-11:20</td>
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<tr>
<td>Session 3: Thermal Protection Systems 2 (Martinique Meeting Room)</td>
<td>Session 3: Extreme Environment Materials 3 - Ceramics Fabrication and Modeling (Jamaica off hotel lobby)</td>
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<td><strong>Afternoon Sessions</strong></td>
<td><strong>Afternoon Sessions</strong></td>
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<tr>
<td>1:30-5:00</td>
<td>1:30-3:20</td>
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<tr>
<td>Session 1: Behavior and Life of Ceramic Matrix Composites 2 (Salon 1)</td>
<td>Session 1: Behavior and Life of Ceramic Matrix Composites 4 (Salon 1)</td>
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<tr>
<td>1:30-4:20</td>
<td>1:30-5:00</td>
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<tr>
<td>Session 2: Extreme Environment Materials 2 - Structural Insulator and Nozzle Materials (Salon 2)</td>
<td>Session 2: Hypersonic Structural Evaluations 2 (Salon 2)</td>
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<td><strong>Additional Meeting at the Hotel</strong></td>
<td><strong>Additional Meeting at the Hotel</strong></td>
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<td>5:00-6:30</td>
<td>12:00-2:00</td>
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<td>CMH-17 Handbook General Coordination Meeting (Martinique Meeting Room)</td>
<td>CMH-17 Handbook Working Group Meetings (cont.) (Montego &amp; Bermuda Meeting Rooms)</td>
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<tr>
<td>5:00-6:30</td>
<td>12:00-2:00</td>
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<tr>
<td>CMH-17 Handbook Working Group Meetings (Montego &amp; Bermuda Meeting Rooms)</td>
<td>Closeout Coordination Meeting (Martinique Meeting Room)</td>
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<tr>
<td>Steve Atmur, Orbital ATK, Rocket Center, WV</td>
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<tr>
<td>Email: <a href="mailto:Steven.Atmur@OrbitalATK.com">Steven.Atmur@OrbitalATK.com</a></td>
<td>Email: <a href="mailto:Steven.Atmur@OrbitalATK.com">Steven.Atmur@OrbitalATK.com</a></td>
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Steve Atmur, Orbital ATK, Rocket Center, WV
Email: Steven.Atmur@OrbitalATK.com
MONDAY MORNING – JANUARY 22, 2018
Plenary Session
Location: Salons 1 & 2

7:30-8:30am Registration and Continental Breakfast
8:35-8:45am Welcome Remarks by Mike Peretti, USACA Chair
8:45-9:00am Opening Comments by Mark Opeka, Program Chair
9:00-9:40am History of Development and Commercialization of Structural Ceramics for Industrial Gas Turbines and Aircraft Engines at GE
   Krishan Luthra, General Electric Global Research, Albany, NY
9:40-10:20am Army High Temp Materials Portfolio Review
   J. Robert Esslinger, Army Aviation and Missile Research, Development and Engineering Center, Redstone Arsenal, AL
10:20-10:40am BREAK
10:40-11:20am AFRL Hypersonics Strategy
   Keith Bowman, Air Force Research Laboratory, Wright Patterson AFB, OH
11:20-12:00pm Ceramic Matrix Composites Taking Flight at GE Aviation
   Jim Steibel and Brian Dix, General Electric Aviation, Cincinnati, OH
12:00-1:30pm Lunch on your own
MONDAY AFTERNOON – JANUARY 22, 2018
Session 1: Ceramic Matrix Composites 1
Session Chairs: Dennis Fox & J. Douglas Kiser, NASA Glenn Research Center, Cleveland, OH
Location: Salons 1 & 2

1:35-1:40pm  Session Chairs Remarks

1:40-2:00pm  Advanced CMCs for 2700°F Applications
S. Viswanathan, G. Kirby and J. Steibel, GE Aviation Cincinnati, OH
J. Weaver, GE Global Research, Niskayuna, NY

2:00-2:20pm  Progress and Plans for CMC Research at NASA Glenn in 2018
J. Grady, NASA Glenn Research Center, Cleveland, OH

2:20-2:40pm  Updated Composite Materials Handbook-17 (CMH-17) Volume 5 - Ceramic Matrix Composites
C. Davies, Federal Aviation Administration, Atlantic City Intl. Airport, NJ
J. D. Kiser, NASA Glenn Research Center, Cleveland, OH
R. Andrusonis, Wichita State University, Wichita, KS
C. Ashforth, Federal Aviation Administration, Renton, WA
K. David, The Boeing Company, Huntington Beach, CA

2:40-3:00pm  Ceramic Matric Composite (CMC) Materials Guidance for Aircraft Design and Certification
R. Andrusonis, J. Tomblin and M. Opliger, Wichita State University, Wichita, KS
C. Ashforth, Federal Aviation Administration, Renton, WA

3:00-3:20pm  BREAK

3:20-3:40pm  Ceramic Matrix Composite Mode I Fracture Toughness ASTM Standard Development
J. Cuneo and J. Koenig, Southern Research, Birmingham, AL

3:40-4:00pm  A Review of ASTM Standard Test Method for Tensile Strength and Young’s Modulus of Fibers
J. Pegna, Free Form Fibers LLC, Saratoga Springs, NY

4:00-4:20pm  Modeling the Mass Yield, Viscosity and Molecular Weight Distribution of Preceramic Polymers
T. Key, G. Wilks, T. Parthasarthy, D. King, Z. Apostolov and M. Cinibulk, Air Force Research Laboratory, Wright Patterson AFB, OH

4:20-4:40pm  Low-temperature Treatment of a Commercial Polycarbosilane and Its Effect on the Processing of SiC-based Fibers and CMCs
Z. Apostolov, H. Chaput, T. Key and M. Cinibulk, Air Force Research Laboratory, Wright Patterson AFB, OH

4:40-5:00pm  Silicon Carbide/Silicon Dioxide Mixed Ceramic Matrix Resin for CMC Rocket Motor Applications
B. Garcia, Orbital ATK, Corinne, UT
MONDAY AFTERNOON – JANUARY 22, 2018

Session 2: Carbon-Carbon Composites Materials 1

Session Chairs: Mark Jones & Chris Tomko, Naval Surface Warfare Center, Dahlgren, Dahlgren, VA
Craig Ohlhorst, NASA Langley Research Center, Hampton, VA

Location: Jamaica Meeting Room (off hotel lobby)

1:35-1:40pm  Session Chairs Remarks

1:40-2:00pm  Passive to Active Transition for Coated Advanced Carbon-Carbon (ACC-6)
C. Severance, Rensselaer Polytechnic Institute, Troy, NY
B. Butler, University of Virginia, Charlottesville, VA
W. Vaughn and D. Glass, NASA Langley Research Center, Hampton, VA

2:00-2:20pm  Passive to Active Transition over Expanded Pressure Regimes for Coated Advanced Carbon-Carbon (ACC-6)
C. Ohlhorst and W. Vaughn, NASA Langley Research Center, Hampton, VA
C. Coventry, Missouri University of Science and Technology, Rolla, MO
C. Severance, Rensselaer Polytechnic Institute, Troy, NY
B. Butler, University of Virginia, Charlottesville, VA
M. Kardell, The Boeing Company, Berkeley, MO

2:20-2:40pm  Emission Spectroscopic Measurements of the Passive to Active Oxidation Transition for Advanced Carbon-Carbon
B. Butler, University of Virginia, Charlottesville, VA
S. Splinter, P. Danehy, C. Ohlhorst and D. Glass, NASA Langley Research Center, Hampton, VA

2:40-3:00pm  High Temperature Poisson’s Ratio Measurements of Composite Materials
J. Hawbaker, Southern Research, Birmingham, AL

3:00-3:20pm  BREAK

3:20-3:40pm  Development of an Advanced Carbon/Carbon-6 (ACC-6) Database
D. Glass and W. Vaughn, NASA Langley Research Center, Hampton, VA

3:40-4:00pm  Deviation from Isotropy in Quasi-Isotropic Advanced Carbon-Carbon 6 (ACC-6)
M. Mahlin, D. Glass and W. Vaughn, NASA Langley Research Center, Hampton, VA
B. Kubitschek, Analytical Services & Materials, Inc., Hampton, VA

4:00-4:20pm  Interlaminar and In-plane Shear Strengths and Modulus of Carbon-Carbon Composites
W. Vaughn, NASA Langley Research Center, Hampton, VA
R. Molloy, Virginia Polytechnic Institute and State University, Blacksburg, VA
M. Cornish, Missouri University of Science and Technology, Rolla, MO

4:20-4:40pm  Bearing Strength of Advanced Carbon-Carbon 6 (ACC-6) as a Function of Test Angle, Temperature and Lateral Constraint
B. Kubitschek, Analytical Services & Materials, Inc., Hampton, VA
W. Vaughn, D. Glass and M. Mahlin, NASA Langley Research Center, Hampton, VA
MONDAY EVENING – JANUARY 22, 2018

12:00-1:30pm  Exhibitor Set-up

5:00-7:00pm   ITAR RESTRICTED Expo and Networking Social

List of Exhibitors

Allcomp
Bullen Ultrasonics, Inc.
Cincinnati Testing Laboratories
COI Ceramics
Composites Horizons LLC
EEMS, LLC
Element Materials Technology
Exothermics
Fiber Materials, Inc.
Free Form Fibers
Kyocera International, Inc.
Lancer Systems

MATECH
Materials Research & Design
Matrix Composites, Inc.
Plasma Processes, LLC
Starfire Systems
Superior Graphite
3M
Textile Products, Inc.
Textum Weaving
UES, Inc.
Ultramet

Networked Social

Kitchen

Kyocera International Inc.

MATECH

Composites Horizons LLC

Lancer Systems

Exhibitor Set-up

Food Station

UEC

Superior Graphite

Materials Research & Design

Matrix Composites, Inc.

Plasma Processes, LLC

Textile Products, Inc.

Textum Weaving
# Exhibitors Guide

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<th>Company Profile</th>
<th>Booth Number</th>
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<td>Bullen Ultrasonics, Inc.</td>
<td>Bullen Ultrasonics is the world leader in the ultrasonic machining of advanced ceramics and other difficult to machine hard and brittle materials.</td>
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<tr>
<td>Fiber Materials Inc.</td>
<td>FMI designs, develops, and manufactures composite materials and components that perform in the most demanding applications and the most extreme environments. Our core strength is the ability to weave the most intricate fiber reinforcement designs and convert them to products which perform beyond the capabilities of conventional laminate composites, ceramics, and metals. Leveraging these fabrication technologies since 1969, we have grown to be the leading supplier of propulsion hot components and thermal protection system materials in the aerospace industry. Our products enable the most difficult missions, survive at the most extreme temperatures, and provide the greatest reliability to our customers. We proudly serve the U.S. Armed Forces, NASA, and aerospace and industry customers.</td>
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<tr>
<td>Ultramet</td>
<td>Ultramet Extreme Environment Material Solutions: Ultramet develops and manufactures refractory metals, platinum group metals, and ceramics for extreme environments and high performance serving the defense, aerospace, medical and energy industries. Ultramet is an ISO 9001:2015-certified producer of flight-qualified components, comprised of engineers, scientists, and support personnel, production and R&amp;D facilities particularly suited to the research, development and production of advanced materials including high temperature capability, corrosion- and erosion-resistant materials. Find your material solutions by visiting us at <a href="http://www.ultramet.com">www.ultramet.com</a> or, by calling (818) 899-0236PST to speak to a member of our knowledgeable staff.</td>
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<tr>
<td>Cincinnati Testing Labs</td>
<td>Cincinnati Testing Labs specializes in the machining, conditioning &amp; testing of Advanced Materials including Composite, CMC, PMC, MMC, Elastomers, Plastics Ceramics and Metallics. Testing is conducted to customer and standard specifications for all forms of mechanical properties testing including static, fatigue, fracture mechanics, &amp; crack propagation. We can test in temperatures ranging from -320 Deg. F. up to 2800 Deg. F in controlled environments. Stop by our booth and speak to us about your testing needs.</td>
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<tr>
<td>EEMS, LLC</td>
<td>EEMS, LLC is a technology company enabling extreme environment materials solutions through the supply of polymers, resins and related materials that enable manufactures to create products that are able to run hotter, last longer and are lighter.</td>
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<td>COI Ceramics</td>
<td>COI Ceramics is a premiere Manufacturer of ceramic matrix composites for both commercial and DOD applications.</td>
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<td>Textum Weaving</td>
<td>Textum Weaving is an advanced composite fiber weaver focusing on 3D fabrics and 3D preforms as well as standard 2D fabrics in both narrow and wide widths. We have extensive experience with a variety of fibers including ceramics, PAN and PITCH carbon, aramids, metals and others. We work with customers through R&amp;D to develop application specific solutions and then transition those solutions into a production environment.</td>
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<tr>
<td>Element Materials Technology</td>
<td>A recognized leader in testing, inspection, and product certification for over 40 years, Element Cincinnati was established as an independent mechanical testing laboratory with expertise in metals, alloys, and ceramic matrix composites. Our state of the art 60,000 square foot facility, 250+ test machines, and temperature capabilities up to 2700°F enable us to provide high capacity service to customers across a unique range of industries, including aerospace, biomedical, industrial manufacturing, power generation, and transportation.</td>
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<tr>
<td>Lancer Systems</td>
<td>Lancer engineers are experts in lightweight composite material design and application. The realm of composites, which includes thermoplastics, thermosets, and ceramic-matrix materials, sometimes offers intrinsic material properties superior to metal. Areas of potential advantage include weight, stiffness-to-weight ratio, self-lubricity, thermal and/or electrical insulation, performance at extreme temperatures (both cryogenic and &gt; 2500°F) and manufacturing cost. Lancer’s breadth of composites materials and processes experience gives us the ability to identify opportunities for which composites offer advantages to metal, and to design and select appropriate solutions for these applications. Lancer’s market focus is application engineering, rapid prototyping and production volumes typical of Defense applications.</td>
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<tr>
<td>Allcomp</td>
<td>Allcomp is a manufacturer of many different grades of C-C and C-SiC composites reinforced by 2D, 2.5D (needled) and 3D fiber architectures. These composites are designed and efficiently densified using CVI and PIP processes as required to achieve the desirable properties. These composites can be further oxidation protected using advanced multi-layer and functionally-graded coating systems for extremely high temperature applications. Allcomp is AS 9100 certified small company. Allcomp fabricates flight hardware and prototype components per customer specifications. Allcomp focuses our researches in developing and qualifying cost-effective composites with short lead time for commercial and advanced applications.</td>
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<tr>
<td>Free Form Fibers</td>
<td>Free Form Fibers (FFF) is the sole producer of “laser-printed” Silicon Carbide, Boron, and Boron Carbide fibers, among a wide range of materials, in the world. FFF’s unique process harnesses the flexibility of additive manufacturing and the purity of Chemical Vapor Deposition (CVD) in a highly flexible production system for hundreds of simultaneous continuous fibers. If a CVD precursor exists for a given material, it is likely that Free Form Fibers can produce fiber from it. Filaments are small diameter, homogeneous, without a dissimilar core, and can be hundreds of feet long. Diameters can be customized from 15 to 80 microns and modulated along the length. Highly uniform Pyrolytic Carbon and Boron Nitride interphase coatings have been demonstrated with subsequent coating with Silicon Carbide. As with fiber, if a CVD precursor exists for a given material, it is likely that Free Form Fibers can coat its fibers with that material. Fibers are available in tapes of parallel continuous filaments appropriately sized for CMC applications.</td>
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<tr>
<td>Starfire Systems</td>
<td>Starfire Systems, Inc (SSI) is a specialty material company focused on Polymer Derived Ceramics (PDC) and its Polymer-to-Ceramic™ technology. SSI’s core business is synthesis of silicon-based pre-ceramic polymers and SOL-GEL derived oxide forming materials which are used in polymer matrix composites, oxide and non-oxide ceramic matrix composite (CMC) fabrication. SSI’s high temperature materials are useful in a variety of applications where durable, lightweight and high temperature complex shaped CMC’s are required. Some examples of applications are high end</td>
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<tr>
<td>Exothermics, Inc.</td>
<td>Founded in 1996, Exothermics is an established developer and manufacturer of ultrahigh temperature refractory compound materials, diffusion bonded structures and functional electromagnetic materials for aerospace and defense markets. Exothermics is AS9100C and ISO9001 certified, and possesses complete facilities for hot isostatic pressing (HIP), solid laser (laser and TIG) welding, pressureless sintering and large-scale physical vapor deposition (PVD). We have a wide and growing base of experience in producing many different forms (bulk materials, coatings, hybrid structures, etc.) of the Group IV, V and VI borides, carbides nitrides and silicides as well as the refractory metals. Our product base is generally focused on applications in the solid/liquid rocket propulsion, high temperature turbomachinery and low observable materials realm, but we also have ongoing activities which support advanced power generation and energy storage markets as well.</td>
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<tr>
<td>Materials Research &amp; Design</td>
<td>As a small business with a staff of highly skilled, multi-faceted engineers, MR&amp;D is uniquely positioned for lean, responsive analysis and design work to support your company and your customers’ needs. Our extensive experience, in-house material databases and proprietary analysis tools enable accurate, innovative solutions for the advanced material systems of the future. At a time when next-generation materials are ever more costly to manufacture, while lead times and budgets are shrinking, MR&amp;D will ensure your project is completed on time and within budget.</td>
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<tr>
<td>Matrix Composites, Inc.</td>
<td>Matrix Composites, Inc. designs and manufactures a broad range of high performance composite components and assemblies. Founded in 1993, Matrix serves the unique needs of customers engaged in critical applications in industries such as Aerospace, Defense and Commercial/General Aviation. Full service capabilities include design, development, tooling, fabrication, testing and integration. Supported processes include autoclave cure, compression molding, close tolerance resin transfer molding (RTM) and Hot Isostatic Resin Pressure Molding (HiRPM). Contact us today for build-to-print manufacturing or expert assistance with design, fabrication methods, material selection and tooling guidance.</td>
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<tr>
<td>Superior Graphite</td>
<td>Innovating since 1917, Superior Graphite offers a range of Non-Oxide Ceramics, using continuous synthesis to produce a domestic source of Beta-Silicon Carbide, and processing of custom Alpha-Silicon Carbide and Boron Carbide. Capitalizing on a core technology of electro-thermal treatment/purification, engineered Graphite &amp; Carbons are complemented with advanced sizing and custom-mix technologies. Other markets served include energy/thermal management, metallurgy (iron &amp; steel), friction modification, drilling material additives, and polymers/C.A.S.E. materials. Precision grinding and sizing technologies translate into an unmatched ability to alter and customize product attributes to suit specific requirements.</td>
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<tr>
<td>Composites Horizons</td>
<td>Composites Horizons, LLC, a PCC Company, is a leading supplier of high temperature composite structures and assemblies for aerospace, defense, medical and industrial applications. Supplying customers such as GE, Pratt &amp; Whitney, and Rolls Royce we offer a range of products including both high temperature polymer matrix (BMI, polyimides) composites and oxide</td>
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<tr>
<td>MATECH</td>
<td>MATECH specializes in development, prototyping, specialized manufacturing, and application support for high temperature materials and ceramic composites. MATECH is fully integrated, from the manufacture of high temperature ceramic fibers, weaving of fabric, deposition of interface coatings, and CMC densification. MATECH is a leader in ultra-high-temperature (UHT) CMCs for missile propulsion and aerothermal TPS applications. MATECH fabricates CMCs by PIP, CVI, Hybrid CVI/PIP, and FAST CMC processing. MATECH has a dedicated CVI/CVD facility for both interface coatings and erosion resistant EBCs. MATECH has a dedicated weaving lab specializing in high modulus ceramic fibers.</td>
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<tr>
<td>Kyocera International Inc.</td>
<td>Kyocera was established in 1959 as a small workshop in Kyoto City where 28 young colleagues began producing ceramic insulators for TVs. Initially their goal was to be the No.1 company on the street, but they had a bigger dream to become the No.1 fine ceramics company (advanced ceramics company) in the world. With a strong will and pioneering spirit, their limitless efforts made this dream come true. Kyocera is now the world leader in fine ceramics (advanced ceramics).</td>
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<tr>
<td>3M</td>
<td>Manufacturer of Nextel(TM) Ceramic Fibers and woven fabrics for use in multiple aerospace and CMC applications.</td>
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<tr>
<td>Plasma Processes, LLC</td>
<td>Plasma Processes is an AS9100-certified small business specializing in the development and manufacture of high temperature materials, coatings, net-shape structures, and powder processing services. We develop, apply and validate coating solutions for thermal protection, electrical isolation, wear and corrosion resistance and dimensional restoration, in addition to the manufacture of net-shape components by vacuum plasma and EL-Form® deposition processes.</td>
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<td>UES, Inc.</td>
<td>The LHMEL facility is an Air Force sponsored laser-materials interaction test facility located at Wright-Patterson AFB, OH and specializing in all aspects of laser effects on materials including elevated thermal heating in relevant environments. UES, Inc. is the operating contractor for this facility on behalf of the Air Force Research Laboratory, Materials &amp; Manufacturing Directorate (AFRL/RX).</td>
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<tr>
<td>Textile Products, Inc.</td>
<td>Textile Products Inc. develops and manufactures high performance textile structures for a variety of composite applications. These include Ceramic matrix, Carbon/Carbon and polymer resin systems. Fabric forms include 2D,3D, multi-layer and custom designs to meet unique customer requirements. Reinforcements include ceramic, carbon, quartz and aramid yarns.</td>
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TUESDAY MORNING – JANUARY 23, 2018

Session 1: Ceramic Matrix Composites 2
Session Chairs: Dennis Fox & J. Douglas Kiser, NASA Glenn Research Center, Cleveland, OH
Location: Salons 1 & 2

7:30-8:30am  Registration and Continental Breakfast

8:35-8:40am  Session Chairs Remarks

8:40-9:00am  Properties and High Temperature Performance of LCVD-Fabricated Silicon Carbide Fibers  
S. Harrison, Free Form Fibers, Saratoga Springs, NY

9:00-9:20am  Hyperbaric Pressure – Laser Assisted Chemical Vapor Deposition of SiC Fibers  
K. Vinson and G. Thompson, The University of Alabama, Tuscaloosa, AL  
R. Hooper, A. Rau and J. Allen, Dynetics, Inc., Huntsville, AL

9:20-9:40am  Investigation of Alpha Silicon Carbide (2H & 6H-SiC) Coated Carbon Fiber  
A. Trunek, A. Garg, D. Lukco and R. Rogers, NASA Glenn Research Center, Cleveland, OH  
C. Clark, Texas A&M University, College Station, TX

9:40-10:00am  Alpha Silicon Carbide/Carbon Fibers for Use in Composites  
J. Garnier, S. Perkins, K. Koller and W. Patterson, Advanced Ceramic Fibers, LLC, Idaho Falls, ID

10:00-10:20am  BREAK

10:20-10:40am  3M Nextel Spread Tow: Enabling Automated Processing Methods and Unique Composite Constructions  
A. Beaber, A. Ross and M. Simpson, 3M Company, St. Paul, MN  
S. Atmur, COI Ceramics, Rocket Center, WV  
W. Simpson, COI Ceramics, San Juan Capistrano, CA  
A. Szweda, COI Ceramics, San Diego, CA

10:40-11:00am  Evaluation of 3M Nextel Spread Tow in Low Cost Automated Processing Methods for Oxide Ceramic Composite Fabrication  
S. Atmur, COI Ceramics, Rocket Center, WV  
W. Simpson, COI Ceramics, San Juan Capistrano, CA  
A. Szweda, COI Ceramics, San Diego, CA  
A. Beaber, A. Ross and M. Simpson, 3M Company, St. Paul, MN

11:00-11:20am  MATECH C/SiC CMCs Overview  
E. Pope, K. Ringled and T. Rosengren, MATECH, Westlake Village, CA

11:20-11:40am  FAST Densification of Gen2 SiC-SiC CMCs  
E. Pope, K. Ringled and J. Hepp, MATECH, Westlake Village, CA

11:40-12:00pm  Prediction of Temperature Dependent Mechanical Properties of Binder Jet Additive Manufactured Ceramic Matrix Composite Material  
F. Abdi and H. Baid, AlphaSTAR Corporation, Long Beach, CA  
M. Halbig and J. Grady, NASA Glenn Research Center, Cleveland, OH

12:00-1:30pm  Lunch on your own
Session 2: Carbon-Carbon Composites Materials 2

Session Chairs: Mark Jones & Chris Tomko, Naval Surface Warfare Center, Dahlgren, Dahlgren, VA
Craig Ohlhorst, NASA Langley Research Center, Hampton, VA

Location: Jamaica Meeting Room (off hotel lobby)

7:30-8:30am  Registration and Continental Breakfast

8:35-8:40am  Session Chairs Remarks

8:40-9:00am  Characterization of Mode-I and Mode-II Delamination in Monolithic Carbon-Carbon Laminates
J. Radcliffe, D. Glass and C. Ohlhorst, NASA Langley Research Center, Hampton, VA
B. Chang, University Space Research Association, Columbia, MD
E. Schaefer, E. Congdon and T. Hartka, Applied Physics Laboratory, Johns Hopkins University, Baltimore, MD

8:40-9:00am  Characterization of Mode-I and Mode-II Delamination in Monolithic Carbon-Carbon Laminates
J. Radcliffe, D. Glass and C. Ohlhorst, NASA Langley Research Center, Hampton, VA
B. Chang, University Space Research Association, Columbia, MD
E. Schaefer, E. Congdon and T. Hartka, Applied Physics Laboratory, Johns Hopkins University, Baltimore, MD

9:00-9:20am  Modeling a Carbon/Carbon Textile Composite Under Biaxial Cyclic Tension Loading
C. Volle, NIFS Intern, NASA Langley Research Center, Hampton, VA; Student at Old Dominion University, Norfolk, VA
D. Glass and W. Vaughn, NASA Langley Research Center, Hampton, VA

9:00-9:20am  Modeling a Carbon/Carbon Textile Composite Under Biaxial Cyclic Tension Loading
C. Volle, NIFS Intern, NASA Langley Research Center, Hampton, VA; Student at Old Dominion University, Norfolk, VA
D. Glass and W. Vaughn, NASA Langley Research Center, Hampton, VA

9:20-9:40am  Utilizing COMPAS to Develop a Validated Material Model for a Carbon-Carbon Composite Used in Thermal Protection System Applications
S. Flores, A. Gokce, J. Buck, D. Melville and Z. LaBry, ATA-Engineering, San Diego, CA

9:20-9:40am  Utilizing COMPAS to Develop a Validated Material Model for a Carbon-Carbon Composite Used in Thermal Protection System Applications
S. Flores, A. Gokce, J. Buck, D. Melville and Z. LaBry, ATA-Engineering, San Diego, CA

9:40-10:00am  COMPAS: Modeling of Composites Using Machine Learning and Markov Chain Monte Carlo Methods for Parameter Optimization
A. Gokce, J. Buck, S. Flores, D. Najera and R. Davis, ATA-Engineering, San Diego, CA

9:40-10:00am  COMPAS: Modeling of Composites Using Machine Learning and Markov Chain Monte Carlo Methods for Parameter Optimization
A. Gokce, J. Buck, S. Flores, D. Najera and R. Davis, ATA-Engineering, San Diego, CA

10:00-10:20am  BREAK

10:20-10:40am  Affordable 2D Carbon-Carbon Extensions for Propulsion Applications

10:20-10:40am  Affordable 2D Carbon-Carbon Extensions for Propulsion Applications

10:40-11:00am  Affordable 2D Carbon-Carbon Extensions for Propulsion Applications
C. Johnson and B. Moylan, U.S. Army AMRDEC, Redstone Arsenal, AL
G. Russell, i3, Huntsville, AL

12:00-1:30pm  Lunch on your own
TUESDAY AFTERNOON – JANUARY 23, 2018
Session 1: Ceramic Matrix Composites 3
Session Chairs: Dennis Fox & J. Douglas Kiser, NASA Glenn Research Center, Cleveland, OH
Location: Salons 1 & 2

1:35-1:40pm Session Chairs Remarks

1:40-2:00pm Tensile Creep and Dwell Fatigue Behaviors of SiC/SiC Composites with Different Fiber
Architectures in Air under Thermal Gradient Conditions
S. Kalluri and R. Bhatt, Ohio Aerospace Institute, NASA Glenn Research Center, Cleveland, OH

2:00-2:20pm Dynamic Young’s and Shear Moduli and Poisson’s Ratio Using Impulse Excitation Technique
M. Dahlen, Southern Research, Birmingham, AL

2:20-2:40pm Low Temperature Densification of Ceramic Matrix Composites
D. Kopp, J. Wang, A. Diaz-Cano, K. Blinn and R. Riman, Rutgers, The State University of New Jersey, New Brunswick, NJ

2:40-3:00pm Slurry and Melt Infiltration Studies Conducted on SiCf Preforms Using Silicide-based
Engineered Matrices
S. Raj and J. Kiser, NASA Glenn Research Center, Cleveland, OH
K. Keller, E. Boakye, T. Key, P. Mogilevsky and M. Cinibulk, Air Force Research Laboratory, Wright
Patterson AFB, OH

3:00-3:20pm BREAK

3:20-3:40pm Development of Filler Materials for Plasma Arc Welding of SiC based Composites
J. Watts, G. Hilmas and W. Fahrenholtz, Missouri University of Science & Technology, Rolla, MO
S. Landwehr, Rolls-Royce, Indianapolis, IN

3:40-4:00pm Additive Manufacturing of Reinforced Polymer-Derived Ceramics
Z. Eckel, P. Bui, S. Biesboer, J. Hundley and T. Schaedler, HRL Laboratories, LLC, Malibu, CA

4:00-4:20pm CMC Sandwich Structures Incorporating Additively Manufactured Ceramic Cores
T. Stewart, Z. Eckel, C. Lihn, T. Schaedler and J. Hundley, HRL Laboratories, LLC, Malibu, CA

4:20-4:40pm Multi-Scale Modelling of the Mechanical Behavior of Non-Oxide CMC Materials
J. Sharp, e-Xstream Engineering, Bellevue, WA
P. Martiny, e-Xstream Engineering, Mont-Saint-Guibert, Belgium

4:40-5:00pm Modeling Environment Induced Property Degradation of SiC-Fiber Reinforced CMCs
T. Parthasarathy, UES, Inc., Dayton, OH
Q. Yang, University of Miami, Miami, FL
B. Cox, Arachne Consulting, Sherman Oaks, CA
M. Braginsky, University of Dayton Research Institute, Dayton, OH
O. Sudre, Teledyne Scientific, Thousand Oaks, CA
C. Przybyla and M. Cinibulk, Air Force Research Laboratory, Wright Patterson AFB, OH
TUESDAY AFTERNOON – JANUARY 23, 2018

Session 2: Thermal Protection Systems 1

Session Chairs: Matt Gasch, NASA Ames Research Center, Moffett Field, CA
               Carl Poteet, NASA Langley Research Center, Hampton, VA

Location: Jamaica Meeting Room (off hotel lobby)

1:35-1:40pm  Session Chairs Remarks

1:40-2:00pm  Low Strength Assessment of Orion EFT-1 Thermal Protection System
             S. Kellas and J. Reeder, NASA Langley Research Center, Hampton, VA
             N. Currie-Gregg, NASA Engineering & Safety Center, Hampton, VA
             S. Bouslog, M. Fowler and J. Smith, NASA Johnson Space Center, Houston, TX

2:00-2:20pm  Orion Heatshield Thermal Protection System Thermal-Mechanical Flexural Tests with Video Image Correlation
             A. Horning and S.Y. Lin, NASA Langley Research Center, Hampton, VA

2:20-2:40pm  Overview of Heatshield for Extreme Entry Environment Technology (HEEET)
             D. Ellerby, M. Gasch, M. Mahzari, F. Milos, O. Nishioka, M. Stackpoole, E. Venkatapathy, Z. Young and D. Driver,
             NASA Ames Research Center, Moffett Field, CA
             P. Gage, Neerim Corporation, Moffett Field, CA
             C. Kazemba, Science and Technology Corporation, NASA Ames Research Center, Moffett Field, CA
             Y. Mohamedaly, Millennium Engineering and Integration Co., NASA Ames Research Center, Moffett Field, CA
             S. Langston, C. Poteet and S. Splinter, NASA Langley Research Center, Hampton, VA
             M. Fowler, NASA Johnson Space Center, Houston, TX
             C. Kellermann, Jacobs Technology, Inc., NASA Johnson Space Center Houston, TX

2:40-3:00pm  Overview of Heatshield for Extreme Entry Environment Technology (HEEET) Engineering Test Unit (ETU) Manufacturing and Integration
             P. Gage, Neerim Corporation, Moffett Field, CA
             C. Kazemba, Science and Technology Corporation, NASA Ames Research Center, Moffett Field, CA
             Y. Mohamedaly, Millennium Engineering and Integration Co., NASA Ames Research Center, Moffett Field, CA
             M. Fowler, NASA Johnson Space Center, Houston, TX
             C. Kellermann, Jacobs Technology, Inc., NASA Johnson Space Center Houston, TX

3:00-3:20pm  BREAK

3:20-3:40pm  HEEET Carrier Structure Pressure Tests
             S. Splinter and C. Poteet, NASA Langley Research Center, Hampton, VA
             K. Peterson, O. Nishioka and Z. Young, NASA Ames Research Center, Moffett Field, CA

3:40-4:00pm  Arcjet Testing of the HEEET Thermal Protection System in Extreme Environments
             M. Gasch, M. Mahzari, M. Stackpoole and D. Ellerby, NASA Ames Research Center, Moffett Field, CA
             C. Kazemba, Science and Technology Corporation, NASA Ames Research Center, Moffett Field, CA

4:00-4:20pm  HEEET Mechanical Behavior
             C. Poteet, NASA Langley Research Center, Hampton, VA
             K. Peterson, NASA Ames Research Center, Moffett Field, CA

4:20-4:40pm  HEEET LHMEI Four-Point Bend Tests
             S. Splinter and C. Poteet, NASA Langley Research Center, Hampton, VA
             O. Nishioka, M. Mahzari and K. Peterson, NASA Ames Research, Center, Moffett Field, CA

4:40-5:00pm  Parametric Study of the HEEET CTE Panel
             C. Poteet and S. Splinter, NASA Langley Research Center, Hampton, VA
             K. Peterson, NASA Ames Research Center, Moffett Field, CA

5:00-5:20pm  Effect of Material Stiffness Reduction in a 3-D Woven Thermal Protection System
             S. Langston, NASA Langley Research Center, Hampton, VA
             K. Peterson, NASA Ames Research Center, Moffett Field, CA
TUESDAY EVENING – JANUARY 23, 2018

5:00-7:00pm    ITAR RESTRICTED Expo and Networking Social
7:30-8:30pm    Exhibitor Breakdown
WEDNESDAY MORNING – JANUARY 24, 2018
Session 1: Behavior and Life of Ceramic Matrix Composites 1
Session Chairs: Craig Przybyla & George Jefferson, Air Force Research Laboratory, Wright Patterson AFB, OH and Jennifer Pierce, University of Dayton Research Institute, Dayton, OH
Location: Salon 1

8:15-8:20am  Session Chairs Remarks

8:20-8:40am  Imaging and Multiscale Modeling of a SiC-SiC CMC Laminate in Bending at High Temperature
G. Henson, A. Singhal, Y. Gao and M. Schuster, GE Global Research Center, Niskayuna, NY

8:40-9:00am  Imaging the Life-Cycle of CMCs using High-Resolution X-ray Computed Tomography
P. Creveling and M. Czabaj, University of Utah, Salt Lake City, UT
C. Przybyla, Air Force Research Laboratory, Wright Patterson AFB, OH
T. Key and D. King, UES, Inc., Dayton, OH
D. Marshall, University of Colorado Boulder, Boulder, CO
D. Parkinson and H. Barnard, Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA

9:00-9:20am  Quantifying Damage Evolution in SiC/SiC CMCs Using In-Situ Synchrotron X-ray Tomography
A. Hilmas, K. Sevener and J. Halloran, University of Michigan, Ann Arbor, MI
A. Singhal, Y. Zhou, E. Maillet, Y. Gao, G. Henson and M. Schuster, GE Global Research Center, Niskayuna, NY
G. Wilson, GE Aviation, Evendale, OH

9:20-9:40am  Characterization of SiC-SiC CMC Constituents via Instrumented Indentation
G. Henson, M. Schuster and J. Gao, GE Global Research Center, Niskayuna, NY

9:40-10:00am ICME Modeling Framework for the Development of Ceramic Matrix Composites
O. Sudre, G. Nilakantan, J. Jung, R. Mansour and S. Lucato, Teledyne Scientific & Imaging, Thousand Oaks, CA

10:00-10:20am BREAK

10:20-10:40am Enviro-Mechanical Modeling of SiC/SiC Composites
M. Braginsky, University of Dayton Research Institute, Dayton, OH
T. Parthasarathy, UES, Inc., Dayton, OH

10:40-11:00am SiC Fiber Strength and Oxidation Kinetics in Air, Low pO2 and Steam
R. Hay, Air Force Research Laboratory, Wright Patterson AFB, OH

11:00-11:20am Material Informatics Approach for Modeling Transverse Strength in SIC/SiC Composites
D. Patel and T. Parthasarathy, UES, Inc., Dayton, OH
M. Braginsky and D. Rapking, University of Dayton Research Institute, Dayton, OH
C. Przybyla, Air Force Research Laboratory, Wright Patterson AFB, OH

11:20-11:40am Analysis of Intermediate Temperature Oxidation Failure in SiC/SiC Ceramic Matrix Composites
J. Shaw, Pratt & Whitney, East Hartford, CT
R. Kumar and G. Ojard, United Technologies Research Center, East Hartford, CT
J. Fish and Z. Yuan, Columbia University, New York, NY

11:40-12:00pm Coupled Chemomechanical Growth and Recession
M. Anguiano Chavez and A. Masud, University of Illinois Urbana-Champaign, Champaign, IL
R. Hall, Air Force Research Laboratory, Wright Patterson AFB, OH

12:00-1:30pm Lunch on your own
WEDNESDAY MORNING – JANUARY 24, 2018
Session 2: Extreme Environment Materials 1 – New Materials Development
Session Chairs: Eric Wuchina, Naval Surface Warfare Center, Carderock, West Bethesda, MD
Gautham Ramachandran, Lockheed Martin ATC, Palo Alto, CA
Location: Salon 2

7:30-8:30am Registration and Continental Breakfast

8:35-8:40am Session Chairs Remarks

8:40-9:00am Fine Braided Tungsten Reinforced Ceramic Composites for Ultra Sharp Structures
D. Caputo and K. Buesking, Materials Research & Design, Wayne, PA
H. Lam and M. Grudza, DE Technologies, King of Prussia, PA
S. DiPietro, Exothermics, Amherst, NH

9:00-9:20am Selective Laser Melting for the Preparation of Ultra-High Temperature Ceramic Coatings
C. Carney, Air Force Research Laboratory, Wright Patterson AFB, OH
D. King, K. Cissel and T. Key, Air Force Research Laboratory, Wright Patterson AFB, OH and UES, Inc., Dayton, OH
J. Middendorf, Universal Technology Corporation, Dayton, OH

9:20-9:40am UHTC Development Challenges Using Hf-Ta-N-C Quaternary System
S. Opekka, I. Park, K. Keller and B. Sirn, UES, Inc., Dayton, OH
L. Matson, Air Force Research Laboratory, Wright Patterson AFB, OH

9:40-10:00am Rapid Ultra-High Temperature Testing of UHTCs
M. Ross, C. Smith, N. Leon and G. Thompson, University of Alabama, Tuscaloosa, AL

10:00-10:20am BREAK

10:20-10:40am Effects of Transition Metals on Elevated Temperature Thermal Properties of ZrB2
A. Stanfield, W. Fahrenholtz and G. Hilmas, Missouri University of Science & Technology, Rolla, MO

10:40-11:00am Metallized Ceramic-Based Structural Insulators
J. Pluscauskis, Plus Designs, Inc., Rosemont, PA
J. Shigley and R. Roberts, Orbital ATK, Corinne, UT
D. Butts, Plasma Processes, LLC, Huntsville, AL

11:00-11:20am Oxidation Behavior of Hypersonic Materials in High Enthalpy Flows Using an Oxyacetylene Torch Facility
E. Corral, The University of Arizona Tucson, AZ

11:20-11:40am Efficient Polymer-Derived UHTC Synthesis
M. Laskoski, U.S. Naval Research Laboratory, Washington, DC
B. Dyatkin and T. Butler, NRC Post-Doctoral Researcher, U.S. Naval Research Laboratory, Washington, DC

12:00-1:30pm Lunch on your own
WEDNESDAY MORNING – JANUARY 24, 2018
Session 3: Thermal Protection Systems 2
Session Chairs: Matt Gasch, NASA Ames Research Center, Moffett Field, CA
Carl Poteet, NASA Langley Research Center, Hampton, VA
Gary Tiscia, Materials Research & Design, Inc., Wayne, PA
Location: Martinique Meeting Room

7:30-8:30am Registration and Continental Breakfast
8:35-8:40am Session Chairs Remarks
8:40-9:00am Manufacturing and Characterization of 3D-Woven Thermal Protection System
   A. Tomich, TEAM, Inc., Woonsocket, RI
9:00-9:20am Development of Lyocell based Phenolic Impregnated Carbon Ablators
   S. Violette, Fiber Materials, Inc., Biddeford, ME
   M. Stackpoole and E. Venkatapathy, NASA Ames Research Center, Moffett Field, CA
9:20-9:40am Pressure Venting Tests of Phenolic Impregnated Carbon Ablator (PICA)
   M. Blosser, Max Blosser Consulting, Newport News, VA
9:40-10:00am Thermal and Mechanical Characterization of Silica Cloth Reinforced Benzoxazine (SCB)
   Composites Up to 2500°F
   B. Patel, A. Williams and J. Koenig, Southern Research, Birmingham, AL
   J. Esslinger, A. Napier and J. Richman, U.S. Army AMRDEC, Redstone Arsenal, AL
   B. Hayes, Applied Poleramic, Inc., Benicia, CA
10:00-10:20am BREAK
10:20-10:40am Optimization of Low-Density Foam-Reinforced Ablators for High-Velocity, High Heat Flux Earth Return Missions
   V. Arrieta and B. Williams, Ultramet, Pacoima, CA
   W. Congdon and J. Jerding, ARA Ablatives, Denver, CO
   B. Sullivan and M. Dion, Materials Research & Design, Wayne, PA
   M. Droege, Ocellus, Livermore, CA
10:40-11:00am Calibration of High Temperature Instrumentation for use in Hypersonic Applications
   S. Massey, Southern Research, Birmingham, AL
11:00-11:20am High Definition Fiber Optic Sensing Techniques for Composite Material Testing
   M. Davis, Luna, Inc., Roanoke, VA
11:20-11:40am Wireless Temperature Sensor for High-Temperature Environments with Sensing Distance of 0.5 Meters
   C. Xu and J. Daniel, Florida State University, Tallahassee, FL
12:00-1:30pm Lunch on your own
WEDNESDAY AFTERNOON – JANUARY 24, 2018

Session 1: Behavior and Life of Ceramic Matrix Composites 2
Session Chairs: Craig Przybyla & George Jefferson, Air Force Research Laboratory, Wright Patterson AFB, OH and Jennifer Pierce, University of Dayton Research Institute, Dayton, OH
Location: Salon I

1:35-1:40pm  Session Chairs Remarks

1:40-2:00pm  Modeling of Time-Dependent Strength Degradation of SiC/SiC Ceramic Matrix Composites via MAC/GMC Computer Code
S. Mital, University of Toledo, Toledo, OH  
S. Arnold, P. Murthy, B. Bednarcyk and E. Pineda, NASA Glenn Research Center, Cleveland, OH

2:00-2:20pm  Low Risk Nonlinear Analysis Approaches in Sizing CMCs
A. Bhattacharya, Northrop Grumman, Redondo Beach, CA

G. Nilakantan and O. Sudre, Teledyne Scientific & Imaging, Thousand Oaks, CA  
J. Cuneo, Southern Research, Birmingham, AL

2:40-3:00pm  3-D Reinforced CMC Blades and Vanes with Temperature Capability of 2700°F
J. Jung, R. Mansour and O. Sudre, Teledyne Scientific & Imaging, Thousand Oaks, CA  
D. Marshal, University of Colorado, Boulder, CO  
B. Cox, Arachne Consulting, Sherman Oaks, CA

3:00-3:20pm  BREAK

3:20-3:40pm  Investigating Damage Mechanisms of CMC Blade Root Sub-elements in Relevant Service Environments Multi-axial Loading of CMCs – Program Overview
E. Jones, G. Jefferson and C. Przybyla, Air Force Research Laboratory, Wright Patterson AFB, OH  
L. Zawada, UTC, Inc., Dayton, OH  
J. Pierce, University of Dayton Research Institute, Dayton, OH  
R. O’Hara, Air Force Institute of Technology, Wright Patterson AFB, OH

3:40-4:00pm  Importance of Measuring SiC Fiber Diameter Prior to Conducting Fiber Stressed Oxidation Tests
J. D. Kiser, R. Sullivan, A. Almansour, D. Gorican, P. Bonacuse, T. McCue and R. Bhatt, NASA Glenn Research Center, Cleveland, OH  
T. Parthasarathy, UES, Inc., Dayton, OH  
M. Cinibulk, Air Force Research Laboratory, Wright Patterson AFB, OH

4:00-4:20pm  Analysis Needs for EBC/CMC Engine Components; Lessons Learned
M. Noe, S. Finn and D. Carper, GE Aviation, Evendale, OH

4:20-4:40pm  CMC Single Lap Shear Joint Analysis and Testing
J. Boston, J. Toney and B. Hauber, Air Force Research Laboratory, Wright Patterson AFB, OH

4:40-5:00pm  A New ASTM Test Standard for the Mode I Interlaminar Crack Growth Resistance (GIC) of Ceramic Matrix Composites
S. Gonczy, Gateway Materials Technology, Mt. Prospect, IL  
F. Abdi, J. Ahmad and C. Godines, AlphaSTAR Corporation, Long Beach, CA  
G. Morscher and R. Mansour, University of Akron, Akron, OH  
J. Shi, Rolls-Royce Corporation, Indianapolis, IN  
G. Ojard, United Technologies Research Center, East Hartford, CT  
S. Choi, Naval Air Systems Command, Patuxent River, MD
WEDNESDAY AFTERNOON – JANUARY 24, 2018

Session 2: Extreme Environment Materials 2 – Structural Insulator and Nozzle Materials

Session Chairs: Joseph Pluscauskis, Plus Designs, Inc., Rosemont, PA
Tim Dominick, Orbital ATK Missile Defense and Controls, Elkton, MD

Location: Salon 2

1:35-1:40pm  Session Chairs Remarks

1:40-2:00pm  Static Testing of Optimized Structural Insulators for Solid Propulsion Control Systems
K. Bonner, T. Dominick, R. Dominelli, R. Pointer and J. Steele, Orbital ATK Missile Defense and Controls, Elkton, MD

2:00-2:20pm  A Technical Evaluation of Coating JT-700 Ceramic Matrix Composite (CMC) with Multiple Refractory Metal Processes
J. Steele, T. Dominick, C. Leslie and K. Bonner, Orbital ATK Missile Defense and Controls, Elkton, MD

2:20-2:40pm  Duct-Cooled Composite Thrust Chamber Technology Maturation
G. Tiscia and B. Sullivan, Materials Research & Design, Inc., Wayne, PA
J. Calvignac, Northrop Grumman Aerospace Systems Corporation, Redondo Beach, CA

2:40-3:00pm  Fabrication and Testing of Advanced Nozzle Materials for MCAT Task Order #7
J. Shigley, R. George and R. Roberts, Orbital ATK Flight Systems Group, Brigham City, UT

3:00-3:20pm  BREAK

3:20-3:40pm  Rayon Replacement for Structural Insulators
L. Weller, Materials Research & Design, Inc., Wayne, PA

3:40-4:00pm  Characterization of MXSE-55 Elastomer-Modified Silica-Phenolic Broadgoods for Ablative Insulator Applications
C. Leslie, R. Hein and T. Dominick, Orbital ATK Missile Defense and Controls, Elkton, MD

4:00-4:20pm  High Temperature, High Strength Structural Insulators: Effect of Heating Rate, Heat Treatment and Orientation on Material Properties and TDACS Performance
K. Buesking and B. Campanella, Materials Research & Design, Inc., Wayne, PA
S. Jones, Allcomp Inc., City of Industry, CA
T. Barnett, Southern Research, Birmingham, AL
THURSDAY MORNING – JANUARY 25, 2018
Session 1: Behavior and Life of Ceramic Matrix Composites 3
Session Chairs: Craig Przybyla & George Jefferson, Air Force Research Laboratory, Wright Patterson AFB, OH and Jennifer Pierce, University of Dayton Research Institute, Dayton, OH
Location: Salon 1

7:30-8:30am Registration and Continental Breakfast
8:15-8:20am Session Chairs Remarks
8:20-8:40am Mode I Crack Growth Resistance of Ceramic Matrix Composites and Anisotropic Stiffness Prediction and Measurement
F. Abdi, C. Godines and J. Ahmad, AlphaSTAR Corporation, Long Beach, CA
R. Mansour and G. Morscher, University of Akron, Akron, OH
S. Choi, Naval Air Systems Command, Patuxent River, MD

8:40-9:00am Interlaminar Behavior of CMCs; Strength, Fracture Toughness and Crack Growth
D. Carper, GE Aviation, Evendale, OH

9:00-9:20am Modeling Approaches for Predicting the Mechanical Behavior and Life of Ceramic Matrix Composite Components
R. Kumar, M. Mordasky and G. Ojard, United Technologies Research Center, East Hartford, CT
J. Shaw, H. Zhang and K. Rugg, Pratt & Whitney, East Hartford, CT
J. Fish and Z. Yuan, Columbia University, New York, NY

9:20-9:40am Life Limiting Behavior of Ceramic Matrix Composites (CMCs) in Interlaminar Shear at Elevated Temperatures
C. Faucett and S. Choi, Naval Air Systems Command, Patuxent River, MD

9:40-10:00am High Temperature Ceramic Microstructure and Interfaces Characteristics Particulate Laden Internal Flow in Gas Turbine Engines
A. Wright and J. Luo, University of California, San Diego, CA
C. Rowe and R. Pegg, Naval Air Systems Command, Patuxent River, MD
D. Zhu, NASA Glenn Research Center, Cleveland, OH
K. Kerner, ADD-AMRDEC, Fort Eustis, VA

10:00-10:20am BREAK

10:20-10:40am Machining Modeling of Oxidation for Life Cycle Improvements of PMC & CMC Components
J. Wadell, B. Becker and R. Keele, Third Wave Systems, Minneapolis, MN

10:40-11:00am Simulation of Stochastic Mud-Crack Damage Formation in an Environmental Barrier Coating
N. Nemeth, P. Murthy, B. Bednarcyk, E. Pineda, D. Zhu and S. Arnold, NASA Glenn Research Center, Cleveland, OH
S. Mital, University of Toledo, Toledo, OH
H. Wadley, University of Virginia, Charlottesville, VA

11:00-11:20am Modeling of Polymer Impregnation and Pyrolysis Process for Ceramic Matrix Composites
U. Santhosh and J. Ahmad, Structural Analytics, Inc., Carlsbad, CA
T. Easler, COI Ceramics, Inc., San Diego, CA
Y. Gowayed, Auburn University, Auburn, AL
G. Ojard, United Technologies Research Center, East Hartford, CT

11:20-11:40am Mechanical Testing for Modeling Oxide CMC’s Structures
B. Kumar, E. Martinez, D. Frias and H. Yun, Honeywell Aerospace, Phoenix, AZ

12:00-1:30pm Lunch on your own
THURSDAY MORNING – JANUARY 25, 2018

Session 2: Hypersonic Structural Evaluations 1

Session Chairs: Anthony Calomino, NASA Langley Research Center, Hampton, VA
Larry Hudson, NASA Armstrong Flight Research Center, Edwards, CA

Location: Salon 2

7:30-8:30am  Registration and Continental Breakfast
8:35-8:40am  Session Chairs Remarks
8:40-9:00am  Status of the CHEX Program
C. Stephens, NASA Armstrong Flight Research Center, Edwards, CA
D. Glass, NASA Langley Research Center, Hampton, VA

9:00-9:20am  Burst and Hermiticity Pressure Testing on Small Diameter C-C Tubes
J. Fody, NASA Langley Research Center, Hampton, VA

9:20-9:40am  Heat Transfer Modeling and Material Property Estimation
E. Frye and K. Daryabeigi, NASA Langley Research Center, Hampton, VA

9:40-10:00am  Carbon-Carbon Thermal Properties
K. Daryabeigi, NASA Langley Research Center, Hampton, VA

10:00-10:20am  BREAK

10:20-10:40am  Design Optimization Framework for a Thermal Protection System
P. Rao and G. Srinivasan, United Technologies Research Center, East Hartford, CT
G. Nilakantan and O. Sudre, Teledyne Technologies, Inc., Thousand Oaks, CA

10:40-11:00am  Hypersonic Structurally Integrated CMC Skins (HySICS): Subelement Analysis, Fabrication and Planned Testing

11:00-11:20am  Generating Material Properties from Flight-Representative Structures
J. Podhiny and B. Sullivan, Materials Research & Design, Inc., Wayne, PA

11:20-11:40am  Development of Simplified Vehicle Model for Determination of Feasible Materials for Hypersonic Vehicles

11:40-12:00pm  Results of Arc-Jet Testing on Leading Edge Materials
W. Howard Poisl, Raytheon Missile Systems, Tucson, AZ

12:00-1:30pm  Lunch on your own
THURSDAY MORNING – JANUARY 25, 2018
Session 3: Extreme Environment Materials 3 – Ceramics
Fabrication and Modeling

Session Chairs: Curtis Martin, Naval Surface Warfare Center, Carderock, West Bethesda, MD
Howard Poisl, Raytheon, Tucson, AZ
Robert Haack, Missile Defense Agency, Huntsville, AL

Location: Jamaica Meeting Room (off hotel lobby)

7:30-8:30am  Registration and Continental Breakfast

8:35-8:40am  Session Chairs Remarks

8:40-9:00am  Silicon Nitride-based Ceramics by Additive Manufacturing
S. Allan, Lithoz America, LLC, Troy, NY

9:00-9:20am  Binder Jetting Additive Manufacturing of Silicon Carbide for Optical Structures
J. Blacker and L. Phalen, The ExOne Company, St Clairsville, OH

9:20-9:40am  Processing and Properties of Zr5Si3X0.6 (X: B, C, N, O)
D. Gerstner, Naval Surface Warfare Center, Carderock, West Bethesda, MD

9:40-10:00am  Grain Size Dependent Mechanical Properties of Hard Nanocrystalline Ceramics
J. Wollmershauser and E. Gorzkowski, Material Science & Technology Division, U.S. Naval Research Laboratory, Washington, DC
H. Ryou, American Society for Engineering Education Postdoctoral Research Fellow sited at Chemistry Division, U.S. Naval Research Laboratory, Washington, DC
E. Patterson and J. Drazin, Material Science & Technology Division, U.S. Naval Research Laboratory, Washington, DC and American Society for Engineering Education Postdoctoral Research K. Wahl, Chemistry Division, U.S. Naval Research Laboratory, Washington, DC
B. Feigelson, Electronics Science & Technology Division, U.S. Naval Research Laboratory, Washington, DC

10:00-10:20am  BREAK

10:20-10:40am  Resistive Ceramic Ignitor Development for Multi-start Hybrid Rockets
J. Selin and A. Fortini, Ultramet, Pacoima, CA

10:40-11:00am  New Approach to Composite Manufacturing for Extreme Environments
J. Garnier and K. Koller, Advanced Ceramic Fibers, LLC, Idaho Falls, ID

11:00-11:20am  Thermal Stress Analysis of Thin Coatings on Tubular Substrates
R. Bryden and E. Buchovecky, Saint-Gobain Ceramics & Plastics, Northboro, MA

12:00-1:30pm  Lunch on your own
THURSDAY AFTERNOON – JANUARY 25, 2018
Session 1: Behavior and Life of Ceramic Matrix Composites 4
Session Chairs: Craig Przybyla & George Jefferson, Air Force Research Laboratory, Wright Patterson AFB, OH and Jennifer Pierce, University of Dayton Research Institute, Dayton, OH
Location: Salon 1

1:35-1:40pm  
Session Chairs Remarks

1:40-2:00pm  
Enhanced Physics Based Prognosis and Inspection of CMCs (EPPIC): Un Update on this AF Program
C. Przybyla and E. Jones, Air Force Research Laboratory, Wright Patterson AFB, OH

2:00-2:20pm  
Carbon-Carbon and Oxide-Oxide Design Properties at Room and Elevated Temperatures
D. Simeroth, M. Stephens, J. Boston and B. Hauber, Air Force Research Laboratory, Wright Patterson AFB, OH

2:20-2:40pm  
Residual Stress investigation in a SMI CMC Using Raman Spectroscopy and X-Ray Diffraction
M. Knauf, U.S. Air Force, Arnold AFB, TN
R. Byron Pipes, Purdue University, West Lafayette, IN

2:40-3:00pm  
Development and Results of Ceramic Matrix Composite Environmental Barrier Coating Durability Model
B. Sullivan, Materials Research & Design, Inc., Wayne, PA

3:00-3:20pm  
CMC Oxidation and Life Prediction: Lessons Learned and the Path Forward
E. Opila, University of Virginia, Charlottesville, VA
THURSDAY AFTERNOON – JANUARY 25, 2018

Session 2: Hypersonic Structural Evaluations 2

Session Chairs: Anthony Calomino, NASA Langley Research Center, Hampton, VA
                Larry Hudson, NASA Armstrong Flight Research Center, Edwards, CA

Location: Salon 2

1:35-1:40pm  Session Chairs Remarks

1:40-2:00pm  Development of Ceramic-Metal Joints for Hypersonic Vehicles and Missile Components
              T. Barnett and M. Dahlen, Southern Research, Birmingham, AL

2:00-2:20pm  Programmatic Update for the AFRL TRIAD CMC Fastener Characterization Program
              J. Cuneo and J. Koenig, Southern Research, Birmingham, AL
              T. Patton, Booz Allen Hamilton, Dayton, OH
              J. Boston and B. Hauber, Air Force Research Laboratory, Wright Patterson AFB, OH

2:20-2:40pm  Fabrication and Evaluation of a Robust, Low-Cost, Fiber-Reinforced Aerogel Insulation
              S. Miller, SD Miller & Associates, Flagstaff, AZ
              M. Blosser, Max Blosser Consulting, Newport News, VA

2:40-3:00pm  Tribological Evaluation of Thermal Protection System Materials for High-Speed Aerospace Vehicles
              S. Taylor and J. DeMange, University of Toledo, Toledo, OH
              J. Mayer, Vantage Partners, LLC, Brook Park, OH
              H. Oravec, University of Akron, Akron, OH

3:00-3:20pm  BREAK

3:20-3:40pm  Evaluations of Aerogel Composite Soft Good Thermal Barriers
              J. DeMange and S. Taylor, University of Toledo, Toledo, OH
              F. Hurwitz, NASA Glenn Research Center, Cleveland, OH

3:40-4:00pm  Replicating Time Phased Trajectory Heating for Hypersonic Structural Component Evaluation
              T. Eason, Air Force Research Laboratory, Wright Patterson AFB, OH

4:00-4:20pm  Combined Environment Testing Capability of Hypersonic Airframe Fuel Containment Structure
              B. Zuchowski, R. Shannon and R. Wittman, Lockheed Martin Aeronautics, Palmdale, CA

4:20-4:40pm  Experimental Evaluation of Hypersonic Vehicle Fuselage Panel
              T. Wyen, Air Force Research Laboratory, Wright Patterson AFB, OH

4:40-5:00pm  Dual Layer TPS Test Demonstration
              L. Hudson, NASA Armstrong Flight Research Center, Edwards, CA
              J. Colich, L. Scuderi and E. Eiswirth, The Boeing Company, St. Louis, MO
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Conference Program Chair

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