

## PRECONFERENCE SEMINARS

(Separate fees required)

**Seminar 1:** Monday, December 5<sup>th</sup> – 8:30 am

### **Low-Cost Carbon Fiber for Emerging Energy Applications**

**Presented by:**

NED STETSON / DOE EERE Fuel Cell Technologies Program

CLIFF EBERLE / Oak Ridge National Laboratory

C. DAVID WARREN / Oak Ridge National Laboratory

TIA BENSON-TOLLE / Air Force Research Laboratory

**Objective:**

Carbon fiber composites (CFCs) have proven to be an enabling material to improve performance of many developing renewable energy platforms; however, the cost can be a hurdle for the growth of these potential high-volume markets. To address this, many new lower cost and energy efficient technologies have been developed through government-funded research and development activities that have yet to be adopted in the commercial CFCs manufacturing sectors. To that point, the objective of this workshop is to identify and understand the barriers to the deployment and adoption of new energy efficient technologies in the carbon fiber (CF) and composites industries and develop pathways towards resolution of these barriers. The workshop will begin with an overview of the Carbon Fiber Technology Facility (CFTF) and continue with a discussion of a portfolio of CF related energy applications from the commercial and military sectors to facilitate discussions towards understanding and addressing the barriers. The meeting scope includes all aspects of CF production from choice of precursors, precursor processing, CF production line (i.e., oxidation, stabilization, carbonization, instrumentation and equipment, etc.), winding and packaging. Additionally, all aspects of CFCs are of interest including thermoset resins, CF-matrix adhesion, CFC joints and durability, CFC damage detection, repair and recycling CFCs.

**Agenda:**

- 8:30am Welcome, Ned Stetson, DOE Fuel Cell Technologies Program, Hydrogen Storage Lead
- 8:35am Overview of the Carbon Fiber Technology Facility at Oak Ridge National Laboratory, Cliff Eberle, Oak Ridge National Laboratory
- 8:45am Overview of CF in Renewable Energy and Transportation Applications in the Commercial Sector, C. David Warren, Oak Ridge National Laboratory, Program Manager for Transportation Materials
- 9:05am Overview of CF in Military and Defense Applications, Tia Benson-Tolle, Air Force Research Laboratory, Technology Director, Nonmetallic Materials Division
- 9:25am Breakout Session
- 10:25am Break (10 min)
- 10:35am Breakout Session
- 11:35am Breakout Session Summary
- 12:20pm Wrap-Up & Closing Remarks
- 12:30pm End

**Dr. Ned T. Stetson / U.S. Department of Energy, Fuel Cell Technologies Program, Hydrogen Storage Team Lead**

Dr. Stetson is a Technology Development Manager for the U.S. Department of Energy's Hydrogen Program with over 18 years of experience in hydrogen storage materials and technology development. Stetson manages hydrogen storage projects, including the Metal Hydride Center of Excellence and the H-Prize. Prior to joining, his research encompassed the discovery and understanding of novel complex metal hydrides at the Univ. of Geneva. Dr. Stetson also spent over 10 years at ECD-Ovonics, where he was involved with the development of novel hydrogen storage materials and hydride-based hydrogen storage systems. He has also been active with the Compressed Gas Association, Society of Automotive Engineers, International Code Council and the International Standards Organization.

**Cliff Eberle / Oak Ridge National Laboratory, Technology Development Manager, Polymer Matrix Composites Group**



Cliff Eberle is the Technology Development Manager for the ORNL Polymer Matrix Composites group. Mr. Eberle is the research leader for ORNL's Carbon Fiber Technology Facility project, bio-carbon fiber program, and ultra-high performance carbon fiber development project. Mr. Eberle is also a significant contributor to strategic planning, intellectual property management, partnership development, program development, and technology transition related to innovative carbon fiber technology. Mr. Eberle has 27 years of professional experience in various engineering, scientific, management, and program development capacities including approximately 15 years of experience with fiber-reinforced composite materials. Mr. Eberle earned his M.S. in Mechanical Engineering from Oklahoma State University in 1984 and joined the staff at Oak Ridge National Laboratory in the same year.

**Dave Warren / Oak Ridge National Laboratory, Program Manager, Transportation Materials**



Mr. Dave Warren is currently the program manager for the Transportation Materials group at Oak Ridge National Laboratory and field technical manager for materials in the Lightweighting Materials Subprogram of DOE Vehicle Technologies. Previously, Mr. Warren has served as program manager for Peacekeeper ICBM propulsion, Small ICBM basing and rail garrison support as a Captain in the United States Air Force prior to joining ORNL in 1991. He has worked in the field of composite materials for 21 years. Mr. Warren conducted all undergraduate and graduate work in materials science and engineering at Vanderbilt University. He currently has 59 technical publications focused mainly on composite materials development and application. He lives with his wife and two children in Knoxville, TN.

**Tia Benson Tolle, Ph.D. / Division Technology Director, Nonmetallic Materials Division, Air Force Research Laboratory**



Dr. Tia Benson-Tolle is the Technology Director of the Nonmetallic Materials Division at the Air Force Research Laboratory's Materials and Manufacturing Directorate. In this position she is responsible for a technical portfolio of approximately \$60M spanning polymers, composites, hybrids, nanomaterials, bio-materials, surfaces, coatings and interface technologies, and materials for thermal management for air, space and cyber applications. She is also a member of the DoD Reliance 21 Materials and Process Community of Interest, which coordinates science and technology across the United States Defense Services of the USAF, Navy, Army, and DARPA as well as collaborations with the National Materials Advisory Board of the National Academies. Prior to this position, she has held the positions of Chief of the Structural Materials Branch, Core Technology Leader for Composite Materials, Chief of the Composites Section of the Structural Materials Branch, Technology Development Leader for Organic Matrix Composites Core Technology Area, Direction Leader for Composites for Spacecraft, and Materials Engineer and Program Manager. Before joining the Materials and Manufacturing Directorate, she

worked as a Composites Structures Engineer at the Composites Advanced Development Program Office, Flight Dynamics Laboratory, Wright Laboratory, and prior to that as an Instructor in the Space Shuttle Flight Training Division, Johnson Space Center, NASA. Her research and leadership in advanced polymeric composite materials has spanned basic research through transition to aerospace weapon systems, working across academia, industry, government organizations and international collaborations. Dr. Benson-Tolle is a Fellow in the Society for the Advancement of Material and Process Engineering (SAMPE). She served as an Executive Cabinet Officer (Secretary, VP, Senior VP, Executive VP), 1998-2005 and as the International President 2005-2006, responsible for developing long term strategic vision, taking the organization global through international relations and coordination, assessing the format and focus of the various conferences, publications and forums, and managing finance, marketing, and staff personnel. She has been active in organizing and leading sessions and panels, was Co-General Chair, SAMPE International Technical Conference, 2007; and the Technical Chair for the SAMPE International Technical Conference 2003. She is a member of the Board of Directors for the Materials Research Society (MRS), 2009-2012. She is also a member of ASME and American Society of Composites (ASC), and an Associate Editor of the Journal of Advanced Materials. She holds a BS in Mechanical Engineering from the University of Washington and a MS and PhD in Materials Engineering from the University of Dayton. She has authored several papers and contributed to a book chapter on nanotechnology.

**List of DOE participants**

1. Scott McWhorter
2. Ned Stetson
3. Grace Ordaz
4. Kathleen O'Malley (scribe)
5. Matt Simon (scribe)
6. Sunita Satyapal
7. Carol Schutte
8. Stephen Sikirica
9. Dave Warren (ORNL)
10. Cliff Eberle (ORNL)
11. Tia Benson-Tolle (AFRL, possible replacement)

**Seminar 2:** Monday, December 5<sup>th</sup> – 1:00 pm

## **2011 Global Market Opportunities for Carbon Fibers: An Industry Evolving into High-Volume Processing**

**Presented by:**

ANTHONY (TONY) ROBERTS / AJR Consultant LLC

DAVID SERVICE/ CEO, Bluestar Fibres Company Ltd.

CHRIS RED / Composites Forecasts and Consulting, LLC (CFC).

As the market penetration of carbon fiber into manufacturing industries continues into its fifth decade, the key to its expansion has been the development of high-quality, high-volume processing technologies. These advancements have been critical to the development of carbon fiber supply base, material converters and manufacturing chain alike. Taking these advancements into account, this seminar will provide a comprehensive outlook and 10-year forecasts for the carbon fiber supply chain. Specific focus areas will include precursor fibers, carbon fiber supply chain, and the global and regional end-user markets between 2011 and 2020.

### **Anthony (Tony) Roberts**

Anthony (Tony) Roberts has over 40 years' experience in the carbon fiber and advanced composites industry sectors. From the 1970s to the 1990s, he was with Courtaulds Grafil, Coventry, UK, developing the growth of applications for carbon fibers in the aerospace, industrial and sports goods sectors. In this capacity, he spent considerable time in Europe, Japan and South East Asia, developing a comprehensive understanding of global markets for carbon fiber. He subsequently moved to Mitsubishi Rayon Co Ltd, working in the USA as Sales and Marketing Director for subsidiary companies Grafil Inc and Newport Adhesives and Composites Inc.

From 2005 to the present, Roberts has served the industry as an independent consultant, working with a range of advanced materials and applications specializing in carbon fiber. He has prepared many individual client studies and in 2006 produced a world carbon fiber marketing report "Global Strategic Market Evaluation". In 2008 he completed a second report on the worldwide strategic carbon fiber evaluation "The Carbon Fibre Industry Worldwide"

Roberts has spent the majority of the last 2½ years working in the carbon fiber industry in China, as a consultant and gathering manufacturer's data and market trends.



## **Chris Red**

Chris Red is the founder and principal of Composites Forecasts and Consulting, LLC (CFC). His duties at CFC include leading the company's market research report development and consulting services.

Red has 14 years of experience in researching and consulting on the markets and opportunities for advanced composites. His exposure as an analytical writer for the composites industry and participation in a number of magazines, and government policy statements and reports has made him a subject matter expert on the market for carbon fiber composites, with a particular emphasis on aerospace and alternative energy markets. Red has a Technical Writing and Multimedia Communication B.S. from Arizona State University.



## **David Service**

David is the CEO of Bluestar Fibres in Grimsby UK. The operation was previously Acordis and before that Courtaulds and as such has been a major supplier of carbon fibre precursor for carbon fibre and oxidised fibre.

Previously David was Research Director and has worked in the area of carbon fibre and precursor for over 20 years. He has presented papers at various conferences on functional fibres and carbon fibre precursor.

David has a BSc and a PhD in polymer science from Heriot Watt University and has been involved in a number of UK government funding projects over the years.

