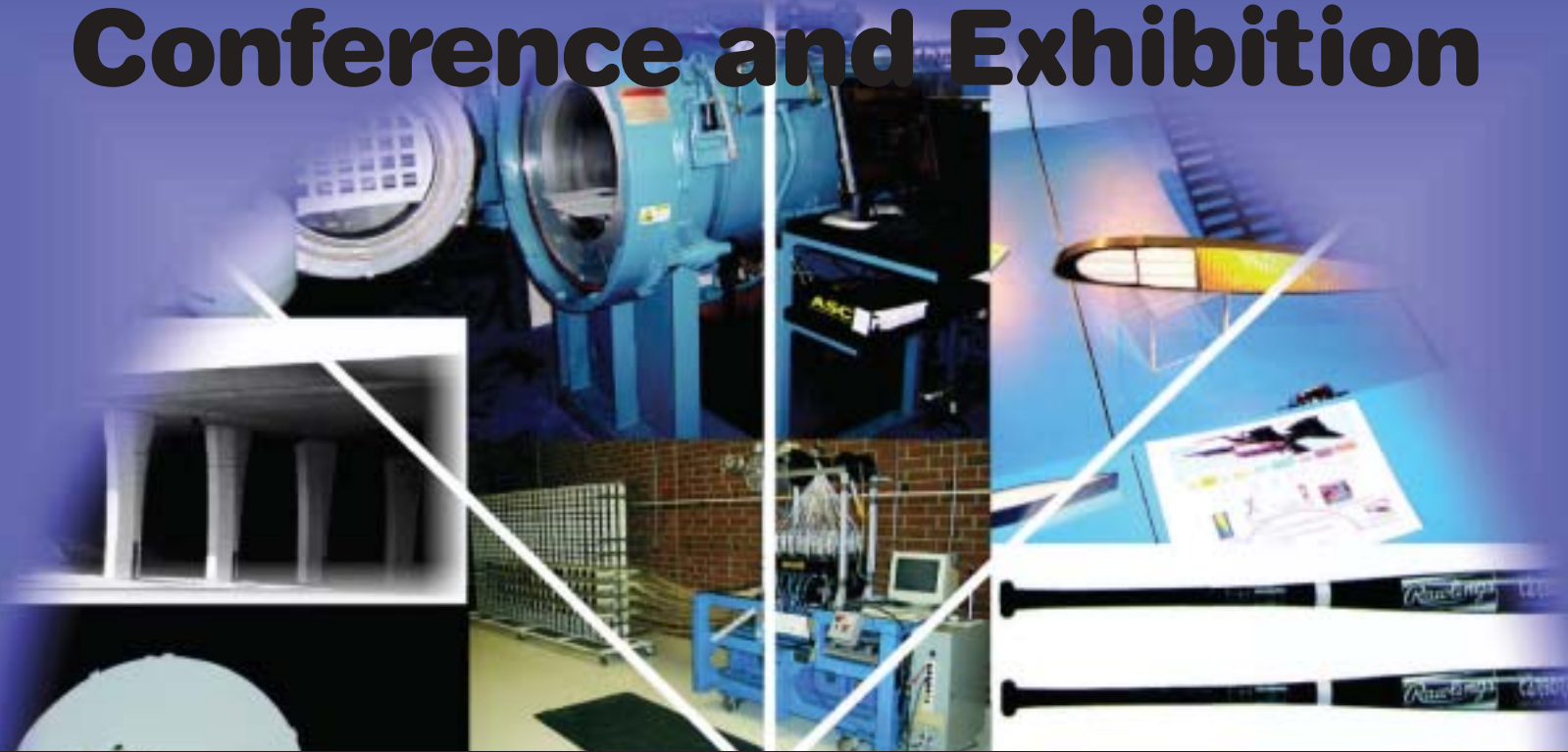


# **SAMPE '08**

## **Conference and Exhibition**



**Material and Process Innovations: Changing our World**



**May 18-22, 2008**  
**Long Beach, California**  
**Long Beach Convention Center**

**Early Bird Registration through March 17. Save \$140!**

Discover the new materials and applications that are shaping the marketplace at SAMPE '08. Featuring industry developments that are changing the field, the SAMPE '08 Conference offers solutions and insight that translate into efficiency and profitability when you return to work.

## The SAMPE '08 Conference and Exhibition Features:

**46** Sessions have been organized to deliver cutting edge advancements that can be used in business today, and some just on the horizon. Each session features multiple presentations, each derived from a fully developed technical paper, which will be included in the conference proceedings.

**11** Skill enhancing pre-conference tutorials. These tutorials are designed with everyone in mind and address questions arising in fields experiencing constant growth. Register early to ensure a spot in one of these very popular classes.

**7** Provocative panel discussions that identify growing concerns in pressing areas of the industry. Our esteemed panelists, people who are shaping and forging the marketplace, will discuss and debate the best way to handle issues affecting the entire field.

**3** Days of exhibit hall exploration, with 300 exhibiting companies eager to help address challenges and meet your companies goals. Take advantage of this opportunity, as admission into the SAMPE Exhibit hall is FREE!

### 2 Keynote Presentations

In addition to the exciting programs being offered at SAMPE '08, we are pleased to announce that this conference will feature two prestigious keynote presenters on Tuesday, May 20:

**Takashi Ishikawa**, *Director, Aviation Program Group, Registration Japan Aerospace Exploration Agency*     **Peter Huntsman**, *President & CEO Huntsman Companies*

For more information about these impressive speakers, check out the full length program at [www.sampe.org](http://www.sampe.org).

### 1 Nanotechnology Conference Track

SAMPE is dedicated to providing the most current conference planning available in the realm of nanocomposites. With tutorials, sessions and panels discussing the ever-present growth and challenges this field has to offer, the SAMPE '08 Nanotechnology Conference Track will fit your nano-information needs.

#### SAMPE thanks the members of the Utah and Japan chapters

##### General Chairs

**Prof. Daniel O. Adams**, *University of Utah*  
**Prof. A. Brent Strong**, *Brigham Young University*  
**Mr. Sakuya Iwai**, *Tokyo Technologies Inc.*  
**Prof. Toshio Tanimoto**, *Shonan Institute of Technology*

##### Technical Program Chairs

**George Hansen**, *Metal Matrix Composites, Inc.*  
**Prof. David Fullwood**, *Brigham Young University*  
**Dr. Takashi Ishikawa**, *Japan Aerospace Exploration Agency*  
**Prof. Hiroyuki Hamada**, *Kyoto Institute of Technology*

## SAMPE Conference Program Descriptions

**Sessions:** Feature presentations by industry professionals, to share their research as it pertains to a new material, process or applications. Each presentation is based upon a full length technical paper, which is included in the Conference Proceedings.

**Panels:** Discussions about a specific problem or issue concerning an aspect of the M&P industry. These discussions often begin with a brief presentation by each panelist, followed by a period of discussion involving all in attendance.

**Tutorials:** Half-day training courses specifically designed to cover a single topic within the M&P field. These courses are best suited for professionals of all technical levels, as the courses feature comprehensive instruction. Tutorials require a separate fee, apart from conference registration.

**Seminars:** SAMPE is affiliated with many highly technical professional associations. These affiliates enhance the SAMPE Conference program with a half day seminar, course programming that does not fall under the organization of SAMPE. Seminars require an additional fee, apart from conference registration.

SAMPE strives to ensure that conference presentations are not marketing-oriented in nature. Our attendees come to learn and it is our mission to keep the conference completely educational.

# Conference Registration Fees

See General Information on page 25 for instructions on how to register. For any questions, contact Priscilla Heredia at +1.626.331.0616, x 610 or email [priscilla@sampe.org](mailto:priscilla@sampe.org).

**REGISTRATION** (sessions, exhibits, panels, proceedings, Monday Banquet, Tuesday Reception, Keynotes, Wednesday Luncheon, registration list)

## EARLY BIRD THROUGH MARCH 17, 2008

	SAMPE Member	Non-Member
Registration Online	\$645	\$745*

## PRE-REGISTRATION MARCH 18-APRIL 21, 2008

Registration Online	\$695	\$795*
Registration Online ( <i>authors/chairs/panel moderators</i> )	\$452	\$517*

## FULL REGISTRATION AFTER APRIL 21, 2008

Registration	\$785	\$885*
Registration ( <i>authors/chairs/panel moderators</i> )	\$510	\$575*

## ONE DAY ONLINE PRE-REGISTRATION

(sessions, exhibits, panels, Tuesday Reception)  
Monday, Tuesday, Wednesday, or Thursday  
Registration           \$350           \$450\*

## ONE DAY ONSITE REGISTRATION

(sessions, exhibits, panels, Tuesday Reception)  
Monday, Tuesday, Wednesday, or Thursday  
                                  \$400           \$500\*

## ONE DAY REGISTRATION

(*authors/chairs/panel moderators*)  
(sessions, exhibits, panels, Tuesday Reception)  
Monday, Tuesday, Wednesday, or Thursday  
                                  \$260           \$325\*

## STUDENT REGISTRATION ONLINE

(sessions, exhibits, panels, Tuesday Reception)

	SAMPE Member	Non-Member
	\$100	\$140

## STUDENT REGISTRATION ONSITE

(sessions, exhibits, panels, Tuesday Reception)

	\$140	\$180
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## TUTORIAL REGISTRATION

With Conf. Reg.	\$150
Full Time Student	\$100
Other Reg.	\$175

## SEMINAR REGISTRATION

CMH-17	\$200
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## NO CHARGE REGISTRATION

(sessions, exhibits, proceedings)  
Press

## EXHIBITS ONLY REGISTRATION

Free to all attendees. Must have a badge to enter.

*\* Includes one year SAMPE membership and the SAMPE Journal*

All phone, fax and mail registrations will incur a \$25 surcharge.

**FOR FURTHER INFORMATION CONTACT: SAMPE**  
1161 Park View Drive, Suite 200 Covina, CA 91724-3751  
Phone: +1.626.331.0616, x 610 Fax: +1.626.332.8929  
• Website: [www.sampe.org](http://www.sampe.org)  
• Registration: [priscilla@sampe.org](mailto:priscilla@sampe.org)  
• Exhibits: [karen@sampe.org](mailto:karen@sampe.org)  
• Membership: [patricia@sampe.org](mailto:patricia@sampe.org)



## SAMPE '08 Annual Bridge and Wing Contests

### 11<sup>th</sup> Annual Bridge Building Contest

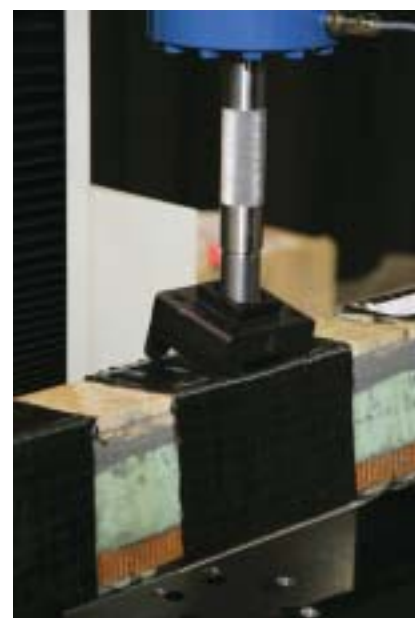
Objective: Design and build the most efficient, single deck composite bridge, with nominal bridge dimensions: 24" long by 4" wide and a max weight of 750 grams.

### 4<sup>th</sup> Annual Wing Contest

Objective: Build an airfoil that has a span of 24", width of 6" and depth of 1/2".

Important:

- Both contests are open to student engineers only.
- All entries must be accompanied by a poster to be judged at the show.
- The entry form and complete set of rules are available at [www.sampe.org](http://www.sampe.org). Be sure to read and understand the contest rules and materials requirements to avoid disqualification.
- Entry forms along with a \$40 fee to defray contest costs must be received by March 14.



# Conference At-a-Glance

\*Requires separate registration fee

<b>Sunday, May 18</b> <b>Registration</b> <b>1:00 PM - 5:00 PM</b>	Tutorials*	2:00 PM - 5:00 PM	Test Methods for Composites Nanocomposites Technology Filament Winding & Fiber Placement Technology
<b>Monday, May 19</b> <b>Registration</b> <b>7:30 AM - 5:00 PM</b>  <b>Exhibits Closed</b>	Tutorials*	9:00 AM - 12:00 PM	Introduction to Composite Materials Resin Infusion/Liquid Molding Technology Thermoplastic Composites Joining & Adhesives Bonding Technology
	Tutorials*	2:00 PM - 5:00 PM	Composites Fabrication Technology Design, Analysis & FEA Modeling of Composites Textile Composites Technology Carbon Fiber Technology
	Sessions	2:00 PM - 5:00 PM	Resins/ Interfaces Automotive Analytical Characterization of Nanocomposites Fire Materials Performance Smart Materials/Shape Memory
	Fellow Banquet	7:00 PM - 9:00 PM	Renaissance Hotel Ballroom
<b>Tuesday, May 20</b> <b>Registration</b> <b>7:30 AM - 5:00 PM</b>  <b>Exhibits Open</b> <b>10:00 AM - 5:00 PM</b>	Keynote Addresses	8:00 AM - 10:00 AM	<b>Takashi Ishikawa</b> , Director, Aviation Program Group, Japan Aerospace Exploration Agency  <b>Peter Huntsman</b> , President & CEO Huntsman Companies
	Sessions	10:00 AM - 12:00 PM	Aircraft Applications Technologies Resin Infusion I Structural Health Monitoring I High Temperature Resins and Coatings I Testing and Test Methods Biomaterials
	Panel	10:15 AM - 12:00 PM	SAMPE Technical Committee Market Overview
	Sessions	1:00 PM - 5:00 PM	Resin Infusion II Structural Health Monitoring II High Temperature Resins and Coatings II Design and Analysis I Multiscale (Fiber Reinforced) Nanocomposite Performance and Processing Adhesives and Bonding
	Panel		New Fellows - Overview of Composites Technology The Current State of Materials and Manufacturing Directorate
	Welcome Reception	5:00 PM - 6:00 PM	The Promenade at the Long Beach Convention Center
<b>Wednesday, May 21</b> <b>Registration</b> <b>7:30 AM - 5:00 PM</b>  <b>Exhibits Open</b> <b>10:00 AM - 5:00 PM</b>	Sessions	8:00 AM - 12:00 PM	Sandwich Cores I Textile and Preform Technology I Durability, Impact and Damage I Civil/Infrastructure I Design and Analysis II Nanomaterials Synthesis and Processing High Temperature Composites/Space Materials
	Panel		Nanotechnology – The Path from Development to Commercialization
	Awards Luncheon	12:00 PM - 1:15 PM	Grand Ballroom at the Long Beach Convention Center
	Sessions	1:30 PM - 5:00 PM	Sandwich Cores II Textile and Preform Technology II Durability, Impact and Damage II Civil/Infrastructure II Design and Analysis III Electrical Properties of Composites/Nanocomposites Space Structures
	Panel		Japanese Market Trends in Fibers and Composites
	Seminar*	1:00 PM - 5:00 PM	2008 Seminar on Composite Materials Handbook 17 (CMH-17)
<b>Thursday, May 22</b> <b>Registration</b> <b>7:30 AM - 1:30 PM</b>  <b>Exhibits Open</b> <b>9:00 AM - 1:00 PM</b>	Sessions	8:00 AM - 12:00 PM	Natural Materials I Advancements in Nondestructive Evaluation I Civil/Infrastructure III Nanoscale Performance and Processing I Thermoplastics Tooling, Repair and Affordability Process Development and Manufacturing I UAV/UCAV
	Sessions	1:00 PM - 5:00 PM	Natural Materials II Advancements in Nondestructive Evaluation II Alternative Energy/Wind Metals and Ceramics Nanoscale Performance and Processing II Process Development and Manufacturing II Pressure Vessel Technology
	Panel		Tech Education-Supplying the Knowledge and Know How



## Discover the Latest Trends and Advancements in the Marketplace

SAMPE '08 is the world's largest exhibition for advanced materials and processes. Exhibitors representing all facets of the industry will be present to help you increase your productivity and profitability.

- ◆ Develop existing business relationships and form new partnerships
- ◆ Meet with your current and new suppliers
- ◆ Discover solutions to your biggest workday challenges
- ◆ Make contact with 200+ exhibiting companies
- ◆ Gain exposure to today's M&P innovative vendors

**Entry into the exhibit  
hall is free!**  
**Register today at  
[www.SAMPE.org](http://www.SAMPE.org)**

### Exhibit at SAMPE '08

Exhibit with SAMPE for an opportunity to reach new prospects and thousand of qualified buyers. Our exhibition hall provides a high demand venue for buyers to meet with suppliers and service providers. Reserve your exhibit space today. Our return from the east coast has generated pent-up demand and exhibit space is running out!

### Enhance Your Investment

SAMPE Exhibitor Sponsorships have been designed to give exhibitors added exposure throughout the SAMPE '08 Conference and Exhibition. Increase your business' visibility and promote brand awareness. Visit [www.sampe.org](http://www.sampe.org) to download exhibitor and sponsorship contracts today.

#### Venue

Long Beach Convention Center  
Entrance: 100 S. Pine Ave.  
Long Beach, CA 90802  
Phone: +1.800.452.7829  
Exhibit Halls A & B

#### Exhibit Hall Fees

100-300 Sq. Ft. \$23.00 per Sq. Ft.  
400-600 Sq. Ft. \$22.00 per Sq. Ft.  
700-900 Sq. Ft. \$21.00 per Sq. Ft.  
1,000+ Sq. Ft. \$20.00 per Sq. Ft.  
*Corner Premium \$230.00 per corner (corner premium applies to in-line or island)*

#### Sales Contact

Karen Chapman  
SAMPE  
1161 Park View Drive, Suite 200  
Covina, CA 91724-3751  
Phone: +1.626.331.0616, x 616  
Mobile: +1.626.926.4861  
Fax: +1.626.966.4318

### Complimentary Exhibit Hall Pass

*There are two ways to use this pass. Register online at [www.sampe.org](http://www.sampe.org) or complete this form and bring it with you to the SAMPE registration counter to receive your "Exhibits Only" badge.*

All information must be completed to receive badge.

*Please print*

Name \_\_\_\_\_  
Last First

Company \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

E-Mail \_\_\_\_\_ SAMPE Member  Yes (FA)  No (FB)

**SAMPE '08, 200 S. Pine Ave., Long Beach Convention Center, Long Beach, CA • Exhibit Dates: May 20-22, 2008**

#### Exhibit Hours

Tuesday, May 20 10:00 AM - 5:00 PM  
Wednesday, May 21 10:00 AM - 5:00 PM  
Thursday, May 22 9:00 AM - 1:00 PM

#### Exhibit Hall Pass

Unlimited visits to exhibit hall  
Access to 300 companies

#### Special Bonus!

##### Two keynote addresses:

Takashi Ishikawa, Tuesday, 8:00 AM  
Peter Huntsman, Tuesday, 9:00 AM

#### Welcome Reception

Tuesday, 5:00 PM

2:00 PM - 5:00 PM

### ***Test Methods for Composites***

Don Adams, Wyoming Test Fixtures, Salt Lake City, UT

### ***Nanocomposites Technology***

Joseph Koo, The University of Texas at Austin, Austin, TX and Louis Pilato, Consultant, Bound Brook, NJ

### ***Filament Winding & Fiber Placement Technology***

Scott Beckwith, BTG Composites Inc., Taylorsville, UT

# Monday, May 19

9:00 AM - 12:00 PM

### ***Introduction to Composite Materials***

Carl Zweben, Consultant, Devon, PA

### ***Resin Infusion/Liquid Molding Technology***

Dirk Heider, University of Delaware, Newark, DE

### ***Thermoplastic Composites***

Amt Offringa, Stork Fokker AESP BV, The Netherlands

### ***Joining & Adhesives Bonding Technology***

Louis Dorworth, Abaris Training Resources Inc., Reno, NV

2:00 PM - 5:00 PM

### ***Composites Fabrication Technology***

James Leslie, ACPT Inc., Huntington Beach, CA

### ***Design, Analysis & FEA Modeling of Composites***

Dewayne Howell, Peak Composites Inc., Arvada, CO

### ***Textile Composites Technology***

Hiroyuki Hamada and Asami Nakai, Kyoto Institute of Technology (KIT), Japan

### ***Carbon Fiber Technology***

Chris Levan, Cyttec Carbon Fibers LLC, Alpharetta, NC

*\*Tutorials require a separate registration fee.*



8:00 AM - 12:00 PM

## Resins/Interfaces

**Chair: Michael O. Wells, Applications Engineer- Arkema Corp.- Functional Additives, King of Prussia, PA**

**Using Controlled Radical Polymerization to Modify Thermoset Resin Cures**, M.O. Wells, S.C. Schmidt, King of Prussia, PA

**Thermal Oxidation of Epoxy Resins**, E. Barjasteh, E. Bosze, S.R. Nutt, University of Southern California, Los Angeles, CA

**Effect of the Particle Size Distribution of AlN on the Properties of Filled Silicone Rubber**, W. Zhou, Xi'an Jiatong University, Xi'an, China; T. Ai, C. Wang, J. Kou, Z. Du, Xi'an Sunward Aerospace Materials Co. Ltd., Xi'an, China

**New Phenylene Bis Oxazoline Based Resins**, B. Schafran, Evonic, Parsippany, NJ; L. Pilato, Pilato Consulting, Bound Brook, NJ

**Material and Process Innovations with Filled Silicone Elastomers**, B. Burkitt, S. Sivas, R. Thomaier, NuSil Technology, Carpinteria, CA

**Development of Structural FST Compliant Phenolic Molding Compounds for use in Aircraft Interiors**, A. Sanders, D. Dalenberg, Sumitomo Bakelite, Novi, MI

**Crystallization Kinetics of Cypek FC Poly (Ether Ketone Ketone) PEKK**, M. Hojjati, J. Chen, A. Yousefpour, National Research Council Canada, Québec, Canada

**Investigation of Thermoplastic-Thermoset Polymer-Polymer Composites as Self-Healing Materials**, D. Ruic, A.M. Rahmthullah, G.R. Palmese, Drexel University, Philadelphia, PA

**Layered Hybrid Matrices for Carbon Fiber Reinforced Composites**, V.M. Drakonakis, K. Ishiguro, C.N. Velisaris, J.C. Seferis, Polymeric Composite Laboratory, Seattle, WA; G.C. Papanicolaou, University of Patras, Greece

**Toughening Vinyl Ester Resin by a Novel Bio-based Rubber**, X. Geng, A. Grous, J. Robertson, G.R. Palmese, Drexel University, Philadelphia, PA; J.J. LaScala, J.M. Sands, Army Research Laboratory, Aberdeen Proving Ground, MD

## Automotive

**Session Chair: Jim Burns, University of California at San Diego, La Jolla, CA**

**Design, Materials, Manufacturing of the Interiors of the Superbus**, A. Terzi, D. Ocelick, W. Ockels, Delft University of Technology, Delft, The Netherlands

**Design of a Lightweight, Low Profile Bumper for a Solar Vehicle**, C. English, V. La Saponara, University of California, Davis, Davis, CA

**Development and Impact Behaviors of CFRP Guarder Belt for Side Collision of Automobiles**, Invited Speakers: Y. Aoki, H.S. Kim, A. Tabata, College of Science & Technology Nihon University, Chiba, Japan; G. Ben, College of Industrial Technology Nihon University, Chiba, Japan

## Analytical Characterization of Nanocomposites

**Session Chair: Peter T. Lillehei, NASA-LARC, Hampton, VA**

**A Study on the Effect of Multi-scale Reinforcement -- Multiwalled Carbon Nanotubes and Basalt Fibers Reinforced Epoxy Laminates**, W. Chen, M.L. Auad, H. Shen, S. Nutt, University of Southern California, Los Angeles, CA

**The Effect of Interfacial Chemistry on the Cure Behavior of Epoxy/MWNT Nanocomposites**, M.A. Abdalla, D.R. Dean, University of Alabama at Birmingham, Birmingham, AL

**TiO<sub>2</sub> Coated Multiwalled Carbon Nanotube/Epoxy Composites**, C.-C. Ma, S.-M. Yuen, National Tsing-Hua University, Hsin-Chu, Taiwan

**Surface Energies as a Measure of the Interaction between Nanomaterials and Polymer Matrices**, D.J. Burnett, Surface Measurement Systems, Ltd., Allentown, PA; T. Nguyen, National Institute of Standards and Technology, Gaithersburg, MD

## Fire Materials Performance

**Application of Low-Heating Rate TGA Results to Hazard Analyses Involving High-Heating Rates**, K.L. Erickson, Sandia National Laboratories, Albuquerque, NM

**A Novel Approach to Enhance Flame Retardancy of Fiber-Reinforced Composites**, J. Gou, Z. Zhao, University of Central Florida, Orlando, FL

**Intumescent Flame Retardant Polyamide 11 Nanocomposites**, J.H. Koo, S. Lao, T. Moon, H. Jor, W. Yong, C. Wu, The University of Texas at Austin, Austin, TX; A. Morgan, University of Dayton Research Institute, Dayton, OH; G. Wissler, L. Pilato, KAI, LLC, Austin, TX; Z. Luo, Texas A&M University, College Station, TX

**High-Temperature Fiberglass for Aerospace and Maritime Fire Protection Application**, A. Lewis, K. Tran, Glass Inc., International, Chino, CA



## Smart Materials/Shape Memory

**Session Chair: Ernie Havens, Cornerstone Research Group, Dayton, OH**

**Stress Mapping of Smart Adhesive Joints Using Magnetostrictive Fillers**, Y.B. Weber, RAFAEL, Haifa, Israel

**Healable, Shape Memory Polymers for Reflexive Composites**, T. Barnell, T. Margraf, T. Tong, S. Knutson, Cornerstone Research Group, Inc., Dayton, OH

**Self-Sensing and Dispersive Evaluation of Single Carbon Fiber/Carbon Nanotube (CNT)-Epoxy Composites Using Electro-Micromechanical Technique**, J.-M. Park, P.-G. Kim, J.-H. Jang, Gyeongsang National University, Jinju, Korea, W.-I. Lee, Seoul National University, Seoul, Korea; J.-G. Park, Agency for Defense Development, Yusung, Korea; K. Lawrence DeVries, University of Utah, Salt Lake City, UT

**Development of a Simple Morphing Wing Suitable for a UAV**, L.D. Peel, J. Mejia, B. Narvaez, K. Thompson, Texas A&M University - Kingsville, Kingsville, TX

**The Electropolymerization of Conductive Polymer Fibers for Biomimetic Actuators**, Takeo Sato, Takeshi Yamauchi, Hideaki Komiyama, Norio Tsubokawa, Niigata University, Japan

**Design Methodology for Attaching Morphing Components**, J.M. Hermiller, E. Havens, Cornerstone Research Group, Dayton, OH; H.J. Qi, University of Colorado, Boulder, CO

**Analysis of Shape Memory Polymer Characterization**, K. Cable, J. Hermiller, G. Karst, T. Tong, Cornerstone Research Group, Dayton, OH

## SAMPE's Fellow Banquet

7:00 PM - 9:00 PM; Renaissance Hotel Ballroom

On this very special evening, SAMPE honors the material and process industry's best, brightest and most distinguished contributors to the field of materials and processing. At the no-host cocktail reception and during the dinner, you will have a chance to discover why SAMPE has selected these five individuals.

We congratulate our 2008 SAMPE Fellows:

Dr. Klaus Drechsler

Dr. Clement Hiel

Mr. Clark W. Johnson

Dr. James C. Leslie

Dr. Toshio Tanimoto

A banquet ticket is included with a four day conference registration fee. Additional tickets for this event are available for \$60 at the SAMPE registration desk.

# Tuesday, May 20

## Keynotes 8:00 AM - 10:00 AM



**Takashi Ishikawa, Director,  
Aviation Program Group,  
Japan Aerospace Exploration Agency**

Dr. Takashi Ishikawa began his career at the Institute of Space and Aeronautics at Tokyo University, after earning his Doctor of Engineering there. In 2001, Dr. Ishikawa was appointed as Section Head, Composite Structure Section, Airframe Division at the National Aerospace laboratory. His career at the Japan Aerospace Exploration Agency began in 2003, when he was appointed Director of the Advanced Composite Evaluation Technology Center. In 2005, he was appointed Director of the Aviation program, a post he holds today. Dr. Ishikawa holds an adjunct professorship at Nihon University, the Tokyo University of Science, The University of Tokyo and Nagasaki Institute of Applied Science. He has published 60 papers in Japanese major refereed journals and 55 papers in internationally major composite journals.



**Peter Huntsman, President & CEO,  
Huntsman Companies**

After attending the University of Utah, Mr. Huntsman began his professional career in 1983 with Olympus Oil Corporation and in 1986 was named the company's president. In 1987, he joined Huntsman Polypropylene Corporation, a subsidiary of Huntsman Chemical Corporation, as Vice President and became a Senior Vice President and General Manager of Huntsman Chemical Corporation, assisting in directing global manufacturing, marketing and sales for Huntsman Chemical and its affiliated companies in 1992. In 1996, Mr. Huntsman became President and Chief Operating Officer of Huntsman Corporation, and in July 2000, he was named the company's CEO. Huntsman is a global manufacturer and marketer of differentiated chemicals.

10:00 AM - 12:00 PM

*Oral presentations Only*

## How Innovations in Materials and Processes Will Change Our World - Panel

**Panel Moderator: Steve Rodgers, SAMPE International Senior Vice President and the Director of Research and Development for EDO Fiber Science**

Newly developed materials and processes form the foundation upon which new technologies are built. We live in a time of staggering change in which the materials and processes of today will fuel tomorrow's development. If you want to anticipate where technology is headed, this panel was created with you in mind. Panelists will give a short overview of how M&P innovation is expected to impact her or his segment of the industry, whether it is in aerospace, ground transportation, infrastructure or spacecraft. After the presentations are complete, you have the opportunity to tailor the information you gather to your own industry needs during the open forum. In asking questions of these high-visibility panelists you can personally access the very latest, most up-to-date information available in your field of endeavor.

## Resin Infusion I

**Session Chair: Dirk Heider, University of Delaware, Newark, DE**

**Uni-axially Oriented, Impregnate-able Fabrics for FRP Applications**, S. Lake, High Modulus (NZ) Ltd, Auckland, New Zealand; J. Biron, SciArt, Inc., Drummondville, Canada; V. Bailey, SciArt, Inc., Laguna Nigel, CA

**Permeability Prediction in Resin Infusion Flow by Finite Element Method**, C. Huang, S. Thomas, S. Nutt, University of Southern California, Los Angeles, CA; C. Bongiovanni, J. Boyd, Cytec Engineered Materials, Inc., Anaheim, CA

**Resin Bleeding Simulation for the VARTM Process**, M.J. Robinson, J.B. Kosmatka, University of California, San Diego, La Jolla, CA

**VARTM Fabricated Skin Panels with Integrated Hollow Stiffeners**, D. Heider, P. Schulze, M. Finger, J. Tierney, J.W. Gillespie, UD-CCM, Newark, DE

**Variability of Marine Composite Properties in a Manufacturing Round Robin Study**, K.A. Berube, R. Lopez-Anido, University of Maine, Orono, ME

**VARTM Processing and Characterization of Carbon Nanotube-Modified Phenylethynyl Terminated Polyimide Composites**, X. Fu, T. Liu, C. Zhang, R. Liang, B. Wang, FAMU-FSU College of Engineering, Tallahassee, FL; J.C. Fielding, AFRL/MLBCO, Wright Patterson AFB, OH

**VARTM Infusion Development for Carbon/Epoxy Space Applications**, J. Berg, ATK-Aerospace Structures, Clearfield, UT; John Higgins, AFRL, Kirtland AFB, NM

## Structural Health Monitoring I

**Session Chair: Anindya Ghoshal, United Technologies Research Center, East Hartford, CT**

**Embedding Fiber Optics into Composite Materials During a Hand-lay Up**, L. Kolubinski, C. Poon, Z. Fawaz, K. Behdinin, Ryerson University, Toronto, Canada; A. Nakai, Y. Takai, S. Tomohiko, Kyoto Institute of Technology, Kyoto, Japan

**Fatigue Crack Monitoring of Secondary Bonded VARTM Composite Doubler-Plate Joints with Embedded Fiber Bragg Grating Strain Sensors**, R. Silva-Muñoz, R. Lopez-Anido, University of Maine, Orono, ME

**Composite Structural Health Through Evaluation of Properties Changes Due to Environmental Conditions**, Y. Sugita, C. Winkelmann, V. La Saponara, University of California, Davis, Davis, CA

**Embedded Sensors for Composite Structural Health Monitoring**, H.-Y. Tang, V. La Saponara, C. English, University of California, Davis, Davis, CA; W. Lestari, Embry-Riddle Aeronautical University, Prescott, AZ

**Harnessing Triboluminescence for the Health Monitoring of Composite Structures**, T.J. Dickens, O. Okoli, FAMU-FSU College of Engineering, Tallahassee, FL

**Fiber Bragg Grating Interrogators for Structural Health Monitoring**, R.J. Black, B. Mosehi, Intelligent Fiber Optic Systems Corporation, Santa Clara, CA

## High Temperature Resins and Coatings I

**Session Chairs: Garrett Poe and Greg Yandek, Air Force Research Laboratory, Edwards Air Force Base, CA**

**Mechanical Properties of Novel POSS-Reinforced Flexible Sioxanes**, M.A. Belcher, National Institute of Aerospace, Hampton, VA; J.A. Hinkley, NASA Langley Research Center, Hampton, VA; N.N. Kiri, P.T. Lillehei, Dept. of Chemistry and Chemical Biology, Rutgers University, Piscataway, NJ

**Oxygen Plasma Modification of POSS-coated Polyimide Films**, C.J. Wohl, Oak Ridge Associated Universities, Hampton, VA; M.A. Belcher, S. Ghose, National Institute of Aerospace, Hampton, VA; J.W. Connell, NASA Langley Research Center, Hampton, VA

**Low-Melt Viscosity Imides based on Asymmetric Oxydiphthalic Anhydride (a-ODPA)**, K.C. Chuang, NASA Glenn Research Center, Cleveland, OH; J.M. Criss, Jr., M&P Technologies, Inc., Marietta, GA; E. A. Mintz, Clark Atlanta University, Atlanta, GA; D.A. Scheiman, ASRC Inc., Cleveland, OH; B.N. Nguyen, L.S. McCorkle, Ohio Aerospace Institute

**Novel Endcaps and Resins for High-Temperature Composites**, T.K. Tsotsis, N.R. Byrd, The Boeing Company, Huntington Beach, CA; K.J. Shea, University of California, Irvine, Irvine, CA; H.R. Lubowitz, Consultant, Rolling Hills Estates, CA

**Investigation of the Dynamic Melt Rheology of GRC-A-Zeolite L Mixtures**, T.R. Brown, D. Hylton, E.A. Mintz, C. Ingram, Clark Atlanta University, Atlanta, GA; K.C. Chuang, NASA Glenn Research Center, Cleveland, OH

## Testing and Test Methods

**Session Chair: Don Adams, Wyoming Test Fixtures, Salt Lake City, UT**

**Contact Resistance Testing of Expanded Products installed in Composite Laminate**, B. Franada, Fatigue Technology Inc., Seattle, WA

**Laboratory Testing of FTI Expanded Products in Composite Joint Applications**, J. Ransom, D. Bakken, Fatigue Technology Inc., Seattle, WA

**A Characterization Method for the Time-Temperature-Pressure-Cure Dependency of the Viscoelastic Bulk Modulus**, M.K. Saraswat, K.M.B. Jansen, L.J. Ernst, Technical University of Delft, Delft, Netherlands

**Using Digital Image Correlation to Acquire Full-field Displacements and Strains in Carbon Fiber Tensile Tow Experiments and Modified Iosipescu Shear Specimens**, P. Moy, C.A. Gunnarsson, US Army Research Laboratory, Aberdeen Proving Ground, MD

## Biomaterials

**Session Chair: Anton Bowden, Brigham Young University, Salt Lake City, UT**

**Development of Hip Joint Stem By Peek/Cf Composite**, S. Bandoh, B.I.TEC Co., Ltd., Kakamigahara City, Japan

**Using Ice to Mimic Nacre: From Structural Materials to Artificial Bon**, Invited Speaker: Antoni P. Tomsia, Lawrence Berkeley National Laboratory, Berkeley, CA

**Stimuli-Sensitivity of Poly(N-isopropylacrylamide) Gels Containing Polymer-Grafted Carbon Microcoils**, S. Sato, T. Yamauchi, N. Tsubokawa, Niigata University, Japan; K. Kawabe, Y. Hishikawa, S. Motojima, CMC Technology Development Co. Ltd.

**PH Responsive Characteristics of Micro Gel with DNA-Dye Complex**, T. Nishiyama, T. Yamauchi, N. Tsubokawa, N. University, Japan; Y. Kagami, Chitose Institute of Science and Technology Chitose, Chitose, Japan

**Plasma Treated Polypropylene Fibers Used to Reinforce Hydrogels for Fibrous Cartilage Applications**, J. Holloway, G. Palmese, A. Lowman, Drexel University, Philadelphia, PA

**Characterization of Room Temperature Ionic Liquid Solvent Based Free Radical Copolymerized Network Gels**, J.F. Stanzione III, G.R. Palmese, Drexel University, Philadelphia, PA; R.E. Jensen, Army Research Laboratory, Aberdeen Proving Grounds, MD

**Silicon Nitride for Orthopedic Applications**, M. Anderson, J. Bernero, Amedica Corporation, Salt Lake City, UT

**Development of Hip Joint Stem by Peek/CF Composite**, Shun-ichi Bandoh, B.I.TEC Ltd.

## Aircraft Applications Technologies

**Session Chair: Dave Widauf, US Air Force as a Squadron Director, Hill Air Force Base**

**Prestressed Carbon / Fiber Thermoplastic Electromagnetic Railgun (ITAR)**, A.G. Littlefield, J.B. Root, R.J. Mysliwiec, US Army RDECOM-ARDEC Benét Laboratories, Watervliet, NY

**Oxidative Wear of C/C Composite Aircraft Brakes at Various Landing Energy Condition Simulations**, S. Ozcan, K. Peszynska-Bialczyk, P. Filip, Southern Illinois University, Carbondale, IL

**Design, Development, and Analysis of a Hybrid Bistable Structure for Energy Absorption**, S.H. Kim, J. Garcia, V. La Saponara, University of California, Davis, Davis, CA

**Mainlanding Gear Fittings in CFRP**, M. Siemetzki, EADS Deutschland GmbH, Munich, Germany

**Thermal Mismatch Issues Between Composite-Aluminum Interfaces in Aircraft Structural Design**, J.J. Tierney, D. Heider, J.W. Gillespie, Jr., University of Delaware, Newark, DE

**Development and Mechanical Properties Verification of VARTM Composite Full-scale Wing Demonstrator**, Y. Hirano, Y. Aoki, Y. Iwahori, S. Sugimoto, Y. Nagao, APG/Japan Aerospace Exploration Agency, Japan

**Trial Production of Complex Contour Wing Structure Fabricated by VARTM Technique**, Y. Iwahori, Japan Aerospace Exploration Agency, Japan; N. Uota, Kado Corporation, Japan

1:00 PM - 5:00 PM

## Resin Infusion II

**Session Chair: Dirk Heider, University of Delaware, Newark, DE**

**Aerospace VARTM Processing**, D. Heider, UD-CCM, Newark, DE

**Role of Flow Velocity on Preform Saturation in Liquid Composite Molding Processes**, V. Neacsu, J.M. Lawrence, S.G. Advani, University of Delaware, Newark, DE

**Transverse Mobility/Permeability Prediction of Fibrous Porous Media in a Periodic Domain**, W.R. Hwang, H.L. Liu, Gyeongsang National University, Jinju, South Korea; J.F. Wang, Jiangsu University, Zhenjiang, China

**Experimental Study of Void Growth During Curing Stage in VARTM Process**, K.-T. Hsiao, V.R. Kedari, University of South Alabama, Mobile, AL

**Mechanical Properties of Aged PETI-330 Laminates Fabricated by Resin Transfer Molding**, S. Bain, Bain Consulting International Inc., Ontario, Canada; H. Ozawa, Ube America, Inc., New York, NY; J.M. Criss, Jr., M&P Technologies, Inc., Marietta, GA

**Minimizing Thickness Variation in Vacuum Infusion (VI) Process**, B. Yenilmez, E. Murat Sozer, Koc University, Istanbul, Turkey

**Analysis and Application of Vacuum Assisted Resin Transfer Molding Process**, Y.-J. Lee, Y.-T. Jhan, National Taiwan University, Taiwan; C.-H. Chung, United Ship Design and Development Center, Taiwan

## Structural Health Monitoring II

**Session Chair: Anindya Ghoshal, United Technologies Research Center, East Hartford, CT**

**Quantitative Detection of Bond Defects in Composite Aircraft Panels by Global-Local Ultrasonic Method**, A. Srivastava, I. Bartoli, F. Lanza di Scalea, University of California, San Diego, La Jolla, CA

**Influence of Embedded Structural Health Monitoring Sensors on the Mechanical Performance of Glass/Epoxy Composites**, C. Winkelmann, V. La Saponara, University of California, Davis, Davis, CA

**Implementation of a Structural Health Monitoring System for Carbon Composite Cables**, K.A. Berube, R. Lopez-Anido, V. Caccese, University of Maine, Orono, ME

**Experimental Verification of Impedance-Based Wireless Sensor Nodes**, G. Park, K.M. Farinhold, S.G. Taylor, C.R. Farrar, Los Alamos National Laboratory, Los Alamos, NM

**Impulse Source Localization in Structures**, Anindya Ghoshal, United Technologies Research Center, East Hartford, CT

**On the Gage Factor for Optical Fiber Grating Strain Gages**, R.J. Black, B. Moslehi, L. Oblea, Y.-L. Park, D. Zare, Intelligent Fiber Optic Systems Corporation, Santa Clara, CA; C. Nelsen, Air Force Research Laboratory, AFRL/RXLP, Wright Patterson AFB, OH; C. Sterner, Acreo AB, Kista, Sweden

**Impulse Source Localization in Structures**, A. Ghoshal, United Technologies Research Center, East Hartford, CT; Ming Cao, General Motors Research Center, Warren, MI

## High Temperature Resins and Coatings II

**Session Chairs: Garrett Poe and Greg Yandek, Air Force Research Laboratory, Edwards Air Force Base, CA**

**Crystallization Augmentation of Poly(ether-ketone-ketone) through Nanoparticle Hybridization**, G.R. Yandek, J.M. Mabry, Air Force Research Laboratory, Edwards, AFB, CA; L.M. McGrath, ERC, Inc., Edwards AFB, CA; M. Lamontia, M.B. Gruber, Accudyne Systems, Inc., Newark, DE

**Thermal Protection Coating and It's E-Beam Cured Technology**, M. Shuya, G. Dongzi, Beijing System Design Institute of Electro-Mechanic Engineering, Beijing, China

**Characterization of Polyimide Reactions: Solvent Removal, Imidization, and Crosslinking Steps (ITAR)**, J. Lee, University of Dayton Research Institute, Dayton, OH; K. Thorpe, J. Brown, Air Force Research Laboratory, Wright Patterson AFB, OH

**Development of Highly Soluble Addition-Type Imide Oligomer "TriA-SI" and Polyimide Composite**, Y. Ishida, T. Ogasawara, R. Yokot, Japan Aerospace Exploration Agency, Japan

**Combustion and Thermal Properties of Epoxy/Phenyl-trisilanol Polyhedral Oligameric Silsesquioxane Nanocomposites**, Q. Wu, C. Zhang, R. Liang, B. Wang, Florida A&M University, Tallahassee, FL

**The Effect of Atomic Oxygen on POSS-Polyimides**, S.J. Tomczak, G. Yandek, J.M. Mabry, Air Force Research Laboratory, Edwards Air Force Base, CA; M.E. Wright, A.J. Guenther, Naval Air Warfare Center, China Lake, CA; T.K. Minton, A.L. Brunsvold, Montana State University, Bozeman, MT; B.J. Pettys, Cephalo

## Design and Analysis I

**Session Chair: Dewayne Howell, Peak Composites Inc., Arvada, CO**

**Composite Part Design-to-Manufacturing Process an End to End Solution**, R. Richardson, Dassault Systemes, Woodland Hills, CA

**Multi-Scale/Multi-Functional Probabilistic Composite Fatigue**, C.C. Chamis, NASA Glenn Research Center, Cleveland, OH

**Evaluation of CFRP Flexural Strength at High Temperature**, T.-K. Hwang, J.-B. Park, H.-K. Kim, Y.-D. Doh, Agency for Defense Development, Daejeon, Republic of Korea

**Strength of Composite Laminates with Multiple Holes**, W.S. Chan, P. Saggarr, University of Texas at Arlington, Arlington, TX; E. Dan-Jumbo; Northrop Grumman Corporation, San Diego, CA

**Comparison of Analytical Solutions and Different Shear Correction Factors in the Static Analysis of Sandwich Composite Plates**, R. Silva-Muñoz, R. Lopez-Anido, University of Maine, Orono, ME

**Optimization of the 787 Horizontal Stabilizer CFRP**, G.E. Poort, The Boeing Company, Seattle, WA

**Manufacturing and Performance Evaluation of Glass-Ribbon Reinforced Optically Transparent Composites**, K. Chandrashekhara, T. Schuman, S. Sundararaman, University of Missouri - Rolla, Rolla, MO; D. Day, M. Velez, MO-Sci Corporation, Rolla, MO; N. Phan, Naval Air Systems Command, Patuxent River, MD

**A Micromechanics Based Constitutive Model for Fiber-Reinforced Composites Utilizing Eshelby's Solution for a Circular Inclusion Within a Finite, Circular RAE**, H.-K. Lee, B.-R. Kim, Korea Advanced Institute of Science and Technology, Daejeon, South Korea

**Predicting Failure Design Envelop for Composite Material System Using Finite Element and Progressive Failure Analysis Approach**, M. Garg, G.H. Abumeri, D. Huang, Alpha Star Corporation, Long Beach, CA

**On the Interaction Between Cross Sectional Geometry and Progressive Damage Behavior of Metallic and Composite Crush Tubes**, A. Najafi, M. Rais-Rohani, Mississippi State University, Mississippi State, MS; G. Abumeri, Alpha STAR Corp., Long Beach, CA

## Multiscale (Fiber Reinforced) Nanocomposite Performance

**Session Chairs: James Ly, Aerojet, Sacramento, CA and Sandi Miller, NASA Glenn Research Center, Cleveland, OH**

**Epoxy Nanocomposites at Ultra Low Multiwalled Carbon Nanotube Concentrations for Underwater Acoustic Applications**, W. Chen, S. Thomas, S. Rajaram, S.R. Nutt, University of Southern California, Los Angeles, CA

**Effect of XD-CNTs on the Mechanical Properties of EPON862-W Epoxy**, A.D. Kelkar, R. Bolick, F. Komuves, R. Mohan, North Carolina A&T State University, Greensboro, NC; C. Zhang, R. Liang, B. Wang, FAMU-FSU College of Engineering, Tallahassee, FL

**Effects of Carbon Nanofibers on Microcracking of Carbon Fiber-Reinforced Composites under Cryogenic/Elevated Temperature Cycling**, J. Gou, University of Central Florida, Orlando, FL

**Viscoelastic Properties of 3D Composites with Nanofilled Polymer Matrices**, N. Zhou, A. Beyle, C.C. Ibeh, Pittsburg State University, Pittsburg, KS

**Manufacturing and Mechanical Testing of Carbon Fiber-Epoxy Composites Reinforced with Surface Treated Carbon Nanofibers**, A. Rodriguez, O. Restrepo, P. Kashani, B. Minaie, Wichita State University, Wichita, KS

**Nano-Particle Enhanced Polymer Materials for Space Flight Applications**, J.M. Criss, Jr., M&P Technologies, Marietta, GA; W.D. Powell, NASA Goddard Space Flight Center, Greenbelt, MD; J.W. Connell, NASA Langley Research Center, Hampton, VA; E.A. Mintz, T. R. Brown, Clark Atlanta University, Atlanta, GA

**Mechanical Properties of Carbon Fiber / Fullerene-Dispersed Epoxy Composites**, T. Ishikawa, Japan Aerospace Exploration Agency, Japan

**Investigation of Dispersion and Rheological Behaviors of Carbon Nanotube-reinforced Polymer Composite**, J. Qiu, C. Zhang, B. Wang, R. Liang, Florida A&M University, Tallahassee, FL

**VARTM Processing and Characterization of Carbon Nanotubes-Modified Phenylethynyl Terminated Polyimide Composites**, X. Fu, C. Zhang, T. Liu, R. Liang, B. Wang, Florida A&M University, Tallahassee, FL

## Adhesives and Bonding

**Session Chair: Kay Blohowiak, The Boeing Company, Seattle, WA**

**Coextrusion of Multilayer Polymer Composites: Blend Morphology and Adhesion Performance**, B. Patham, O. Prakash, GE Research Bangalore, India; H. Asthana, GE Industrial, Mt. Vernon, IN

**Robot Based Induction Welding of Thermoplastic Polymer Composites**, L. Moser, P. Mitschang, A.K. Schlarb, Institut fuer Verbundwerkstoffe GmbH, Kaiserslautern, Germany

**Thermodynamic and Kinetic Curing Effects on the Morphology and Mechanical Properties of Structural Epoxy Film Adhesives**, D. Salnikov, C. George, 3M Company, St. Paul, MN

**The Structural Performance of Hybrid Steel-to-Composite Joints**, S. Mouring, U.S. Naval Academy, Annapolis, MD

**Bond Strength and Durability of Titanium Joints Using TP-\* Adhesive under Different Environmental Conditions**, A.A. Obaid, J.W. Gillespie, Jr. University of Delaware, Newark, DE; T.L. Pike, Q. Nguyen, BAE Systems Land and Armaments, Santa Clara, CA

**Rapid Underwater Curing Adhesives**, D.M. De Bonis, J. La Scala, US Army Research Lab, Aberdeen Proving Ground, MD

**Reliability of Adhesive Interphases for Titanium-Graphite Laminates**, M.S. Oliver, R.H. Dauskardt, Stanford University, Stanford, CA; K.Y. Blohowiak, The Boeing Company, Seattle, WA

**Contamination of Composite Bond Surfaces by Contact with Commonly used Protective Glove Materials**, J. Ubin, C. Hickmott, B.D. Flinn, University of Washington, Seattle, WA

**Impact Performance of a Flexible Adhesive**, F. Kadioglu, Ataturk University, Erzurum, Turkey; R.D. Adams, University of Bristol, Bristol, UK

**Development of New Thin Adhesive Systems and Test Methods for TiGr Laminates**, K. Y. Blohowiak, R. A. Anderson, W. B. H. Grace, J. W. Grob, D. H. Fry, The Boeing Company, Seattle, WA

**Tailorable High Temperature Adhesive Development**, R. A. Gray, J. R. Magato, and R. Vannucci, Maverick Corporation, Cincinnati, OH; G. Dillingham, Brighton Technologies Group, Cincinnati, OH

2:00 PM -4:00 PM

## 2008 SAMPE Fellows Panel

**Moderators: Gary Valentine, Retired Raytheon, Chatsworth, CA and George F. Schmitt, AFRL/MLO, Wright Patterson AFB, OH**

SAMPE's newest Fellow inductees will provide an overview of the technology for which they were elected to this esteemed honorary group. This panel will provide an opportunity for each new SAMPE Fellow to present the areas within their technical field of expertise and then allow the audience time for interaction with the panelists.

Panelists (and newest SAMPE 2008 Fellows):

- Dr. Klaus Drechsler, University of Stuttgart,
- Dr. Clem Hiel, Composite Support and Solutions, Inc. Clark Johnson, Boeing (retired)
- Dr. James Leslie, ACPIT Inc.
- Prof. Toshio Tanimoto, Shonan Institute of Technology

## The Current State of Materials and Manufacturing Directorate-Program Review

**Moderators: Tia Benson Tolle and George Schmitt, US Air Force Research Laboratory, Dayton, OH**

The Air Force Research Laboratory Materials and Manufacturing Directorate provides aerospace materials and manufacturing leadership for the Air Force and the nation and is responsible for the materials and process science and technology base to support all elements of Air Force acquisition and sustainment. Dr David Walker, Director, who is responsible for interfacing these areas throughout the corporate Air Force and Department of Defense and leads an organization of more than 1,200 employees which executes more than \$450 million annually, will outline his vision of advanced materials for the USAF and new directions in AFRL Materials in this plenary talk.

5:00 PM - 6:00 PM

## Welcome Reception

The Promenade at the Long Beach Convention Center Our Welcome Reception is a networking hotspot. Domestic beer, Japanese beer and wine will be served with hors d'oeuvres during the welcome. All badged attendees are welcome.

8:00 AM - 12:00 PM

## Sandwich Cores I

**Session Chair: Steve Nutt, University of Southern California, Los Angeles, CA**

**Correlation Between Experimental and Theoretical Displacements in Sandwich Composite Plates in Static Bending**, R. Silva-Muñoz, R. Lopez-Anido, University of Maine, Orono, ME

**Acoustic Absorption of Honeycomb Sandwich Panels**, P. Peters, S. Nutt, University of Southern California, Los Angeles, CA

**A Study of Sandwich Cores with Non-Straight Cell Walls**, C. Huang, S. Nutt, University of Southern California, Los Angeles, CA; H. Shen, M. Lowry, M.C. Gill Corporation, El Monte, CA

**Multi-Site High Velocity Impact Testing and Simulation Of S2-Glass/SC-15 Balsa Core Sandwich Composites**, L.J. Deka, U.K. Vaidya, University of Alabama at Birmingham, Birmingham, AL

**The Effect of Impedance Mismatch on the Transmission Loss of Sandwich Panels**, C. Naify, S. Rajaram, M. Sneddon, S. Nutt, University of Southern California, Los Angeles, CA

**A New Non-Metallic Acoustic Core with a Buried Septum for Application in Composite Acoustic Panels**, J.M. Welch, B.R. Kitt, J.M. Gallman, Spirit AeroSystems, Wichita, KS; C.R. Smith, E. Ayle, Hexcel, Casa Grande, AZ

**Impact and Post-impact Behavior of Fiber Reinforced Composite Foams**, G. Guo, S. Nutt, University of Southern California, Los Angeles, CA

**Out of Autoclave Material and Process for Sandwich Structures**, P.-L. Chiou, P.K. Oldroyd, Bell Helicopter Textron, Hurst, TX

## Textile and Preform Technology I

**Session Chairs: Alex Bogdanovich, 3Tex, Cary, NC and Chris Pastore, Philadelphia University, Philadelphia, PA**

**3 Dimensional Fiber Structures for Composites and Nanocomposites**, N. Han, 3D Nanocomposites, Valencia, CA; L. Sun, China Medical University, Shenyang, China;

**Technical and Economical performances of 3D Warp Interlock Structures**, F. Boussu, X. Legrand, ENSAIT, Roubaix, France

**Fiber Steered Bay GA and Specific Experimental Device**, X. Legrand, J. Bardy, F. Boussu, ENSAIT, Roubaix, France

**3-D Woven Pi-Preform Joints: An Enabling Technology for Large Composite Structure**, R.P. Schmidt, L.M. Cooke, S.M. Lee, Lockheed Martin Aeronautics Company, Fort Worth, TX

**Effects of Weaving on S-2 Glass Tensile Strength Distribution**, A. Abu Obaid, S.A. Andersen, J.W. Gillespie, Jr., University of Delaware, Newark, DE; B. Dickenson, A. Watson, G. Chapman, R. Coffelt, 3TEX, Inc., Cary, NC

**Design of MTB Frame Using Three Dimensional Braided Composite**, K.J. Kim, W.-R. Yu, Seoul National University, Seoul, Korea

**Computational Modeling and Analysis of Textile Composites: Accomplishments and Challenges**, Alexander E. Bogdanovich, 3TEX, Inc., Cary, NC

## Durability, Impact and Damage I

**Session Chair: Ryam Emerson, Army Research Laboratory, Aberdeen, MD**

**Influence of Hot-Wet Environment on Thermal and Mechanical Properties of Carbon Fiber/Fiberglass Hybrid Composites**, Y.-I. Tsai, E.J. Bosze, S. Nutt, University of Southern California, Los Angeles, CA

**Fiber Bragg Grating Sensors for Fatigue Monitoring of Composite**, Z.-S. Guo, Shanghai University, Shanghai, China

**Design and Development of a Long Fiber Thermoplastic Helmet Liner**, U.K. Vairdy, S. Pillay, H. Ning, D. Littlefield, J.-E. Kim, University of Alabama at Birmingham; S. Walsh, J. Sands, Army Research Laboratory, Aberdeen MD

**Impact Damage Evolution Behavior of CFRP Laminate for Marine Use**, Invited Speakers: H. Saito, I. Kimpara, Kanazawa Institute of Technology, Japan

**Considering the Non-Fickian Moisture Sorption of an E-glass/vinyl-ester Composite**, S. Svetlik, V. Karbhari, University of California, San Diego, La Jolla, CA

**Development of Rapid Durability Evaluation Methods for Polymer Composites in Hot Water and Pressure Conditions**, T. Kaoyanagi, T. Akatu, Y. Fujii, Kyoto Institute of Technology, Japan

**The Role of Folding in the Degradation of Ballistic Fibers**, W.G. McDonough, G. Holmes, J.-H. Kim, D. Ho, National Institute of Standards and Technology, Gaithersburg, MD

## Civil/Infrastructure I

**Session Chairs:** David W. Jensen, The Boeing Company, Seattle, WA and Vistasp Karbhari, University of California San Diego, La Jolla, CA

**An Improved Shear Correction Model for Calculating Shear Strength of Externally Bonded Fiber Reinforced Polymers**, M.A. Faruqi, S. Patil, R. Agarwala, Texas A & M University-Kingsville, Kingsville, TX; A. Asad, Texas A & M University-Corpus Christi, Corpus Christi, TX; H. Estrada, The University of the Pacific, Stockton, CA

**Experimental and FEM Study of the Flexural Behavior of CFRP Strengthened Concrete Structures**, S. Aldajah, A. Biddah, A. Al-Omari, United Arab Emirates University, AL-Ain, UAE

**Improving Damage Tolerance in FRP Laminates for Infrastructure Applications Through Toughened IPN Matrix Materials**, S.R. Ayers, J. Cadman, LeTourneau University, Longview, TX

**Composite Nanoparticle Treatments for Mitigation of Sulfate Attack in Concrete**, K. Kupwade-Patil, H. Cardenas, Louisiana Tech University, Ruston, LA

**Corrosion Mitigation in Concrete Using Electrokinetic Injection of Reactive Composite Nanoparticles**, K. Kupwade-Patil, H. Cardenas, Louisiana Tech University, Ruston, LA

**Latest Breakthroughs in Performance Coating Measurement Over Composite Structures**, J. Pavelka, Sensory Analytics, LLC, Greensboro, NC

**A Comprehensive Durability Database on Polymers and Fiber-Reinforced Polymers (FRPs) Used for Civil Structures Rehabilitation**, Q. Yang, V.M. Karbhari, University of California, San Diego, La Jolla, CA; C. Sikorsky, California Department of Transportation, Sacramento, CA

## Design and Analysis II

**Session Chair:** Dewayne Howell, Peak Composites Inc., Arvada, CO

**Hybrid Composites Using Out of Autoclave Process for Aerospace Sub-Structures**, V. G. K Menta, S. Sundararaman, K. Chandrashekhara, University of Missouri - Rolla, Rolla, MO; N. Phan, T.T. Nguyen, Naval Air Systems Command, Patuxent River, MD

**Characterization of a Unidirectional Carbon Fiber/Epoxy Composite for Prototype Design**, B. O'Toole, S. Nelson, J. Thota, University of Nevada Las Vegas, Las Vegas, NV

**High Strain Rate Characterization of Woven Carbon/Epoxy and Graphite/Epoxy Composites**, R. Foroutan, McGill University, Montreal, Canada; J.A. Nemes, Penn State University, Malvern, PA

**Importance of Accurate Ply Draping Orientation in FE Analysis of Composite Structures**, T. Abbey, FETraining.com, Walnut, CA

**Size Effects on the Bending Strength of Marine Grade Composites -Experiment and Simulation**, J. Nader, H. Dagher, R. Lopez Anido, The University of Maine, Orono, ME

**Fracture Analysis of Interfacial Cracks Between Dissimilar Orthotropic and General Anisotropic Materials Using Enriched Finite Element Method**, U. Ozkan, Lehigh University, Bethlehem, PA

**Materials Possessing Reduced Coefficient of Thermal Expansion**, J.J. Kellar, L. Kjerengtroen, W.M. Cross, W. Douglas, W. Weyer, S. Schnabel, South Dakota School of Mines and Technology, Rapid City, SD

**ILS in Composite Structures with Varying Curvature and Thermal Loading**, T.H. Fronk, E. Clark, Utah State University, Utah; J.F. Noorda, Hypercomp Engineering, Brigham City, UT

**Effect of Pultrusion Variables on Complex Contoured Pultruded Composite Parts Using Finite Element Modeling**, S. Vennam, B. Mutnuri, Institute for Advanced Learning and Research, Danville, VA; R.D. Moffitt, Virginia Polytechnic Institute and State University, Danville, VA

**Damping Measurements of Structures in Vibration by Means of a Laser Head Sensor**, F. Kadioglu, Ataturk University, Erzurum, Turkey

## Nanomaterials Synthesis and Processing

**Session Chair:** Dickson Lao, University of Texas at Austin, Austin, TX

**Electrospun Nanofiber Architectures: Recent Developments in Processing and Applications**, M. Misra, S. Nartker, L.T. Drzal, Michigan State University, East Lansing, MI

**Silver-Nanoclay for Anti-Microbial Applications**, A.L. DiSalvo, Nano Met-Zero Inc., Bernardsville, NJ

**Novel Nanocomposites Based on Silicate Nanotubes of the Mineral Halloysite**, V. Altstaedt, K. Hedicke-Hoechstoeetter, J. Georg Leib, University of Bayreuth, Bayreuth, Germany

**Modeling and Tailoring of Surface Area and Cost of Nanotube Buckypaper Materials**, Z. Liang, C.S. Yeh, G.J. Zhang, C. Zhang, B. Wang, J. Zheng, FAMU-FSU College of Engineering, Tallahassee, FL; S. Walsh, ARL, Aberdeen Proving Ground, MD

**Micro-Alignment of Carbon Nanotube Composite Textiles by Chemically Assisted Mechanical Stretching**, R. Braden, J. Welch, D.S. Lashmore, M. Schauer, B. White, Nanocomp Technologies, Inc., Concord, NH

**Use of Electron Beam Irradiation for Surface Functionalization of Carbon Nanofibers**, M.C. Evora, University of Dayton, Dayton, OH

**Recent Development in Electrospun Nanofiber Architectures: A New Class of Nonwoven Materials**, M. Misra, S. Nartker, L.T. Drzal, Michigan State University, East Lansing, MI

**Transparent Nanoporous Glass-Polymer Composites**, D.J. O'Brien, T. Juliano, D.C. DeSchepper, P.J. Patel, S.H. McKnight, Army Research Laboratory Weapons and Materials Research Directorate, Aberdeen Proving Ground, MD

## High Temperature Composites/Space Materials

*Session Chair: Sandra Tomczak, US Air Force, Edwards, CA*

**Synthesis of Thermal Stable Aromatic Poly(imide-amide-benzimidazole) Copolymers**, H.-H. Wang, Feng Chia University, Taichung, Taiwan

**Thermal and Mechanical Characterization of Foam Core of Poss / Expandable Thermoplastic Microspheres**, V.K. Rangari, W.D. Jones, S.J. Jeelani, Tuskegee University, Tuskegee, AL

**Ablation, Thermal and Mechanical Properties of Carbon Fiber/Phenolic Matrix Composites**, J. Lee, Agency for Defense Development, Daejeon, City, South Korea

## Nanotechnology - The Path from Development to Commercialization - Panel

*Panel Moderator: Max Lake, Applied Sciences Inc., Yellow Springs, OH*

Nanotechnology, representing the opportunity to engineer materials at the molecular level, offers new degrees of freedom for design of composites with higher performance, lower weight, structural health monitoring, longer operating life, lower operating costs, and other advantages. Progress in commercial exploitation of this opportunity has not matched the enthusiasm for nanotechnology expressed worldwide, due to a number of factors. These include the need to develop new rules for incorporating nanoscale materials into conventional composite processing, the absence of a database for nanocomposite performance, the cost of nanomaterials in small volumes, and health and safety concerns related to handling nanomaterials in fabrication processes. This panel will examine these and related issues in the context of technology transfer experience for other advances in composite materials, and will attempt to identify the highest priority elements which now need to be addressed to capture the perceived advantages offered by nanotechnology.

Panelists:

Dr. Lawrence Drzal, Director of Composite Materials and Structures Center, Michigan State University

Dr. Ken Smith, Vice President of Technology, CNI

Dr. Suraj Rawal, Lockheed Martin Space Systems

Dr. Joseph Koo, Univ. of Texas at Austin

12:00 - 1:15 PM

## Awards Luncheon

Grand Ballroom at the Long Beach Convention Center

Join us for this afternoon event as we recognize outstanding members of the material and process industry and SAMPE supporters.

Luncheon vouchers are included with a four day conference registration. Additional vouchers may be purchased for \$35 at the SAMPE registration desk. To receive admission to the luncheon, vouchers must be redeemed for a ticket at the SAMPE Store.

## Sandwich Cores II

*Session Chair: Steve Nutt, University of Southern California, Los Angeles, CA*

**Long-Term Creep Behavior of Sandwich Composites**, Y. Sugita, C. Winkelmann, V. La Saponara, University of California, Davis, Davis, CA; A. Muliiana, Texas A&M University, College Station, CA; R. Haj-Ali, Georgia Institute of Technology, Atlanta, GA

**Static Compressive Properties of Multi-layer Corrugated Sandwich Paperboards**, W. Dongmei, Shenzhen Polytechnic, Shenzhen, China

**Construction of Energy Absorption Figure for Paper Honeycomb Sandwich Panels**, W. Dongmei, Shenzhen Polytechnic, Shenzhen, China

**Water Immersion of Eco-Core And Two Other Sandwich Core Materials**, S. Lingaiah, R.L. Sadler, M.M. Sharpe, K.N. Shivakumar, North Carolina A&T State University, Greensboro, NC

## Textile and Preform Technology II

*Session Chairs: Vince Bailey, Composites Specialists, Laguna Nigel, CA and John Biron, Tex III, Drummondville, Canada*

**Innovative, Stitched Preforms for High Performance Fibre Reinforced-Plastics**, U. Beier, F. Fischer, F. Wolff-Fabris, A. Volker, University of Bayreuth, Bayreuth, Germany; S. Hermann, W. Christian, B. Wolfgang, Eurocopter Deutschland GmbH, Ottobrunn, Munich, Germany

**Large-Scale Joint Fabrication Using 3D Fabrics**, D. Heider, H. Deffor, J.W. Gillespie, Jr., UD-CCM, Newark, DE; M. Mohamed, A. Bogdanovich, 3TEX, Inc., Cary, NC; R. Cranef, NSWC, West Bethesda, MD

**Prediction Method for Fiber Orientation of Rectangular Braided Composite Pipe**, H. Nishimoto, A. Ohtani, A. Nakai, H. Hamada, Kyoto Institute of Technology, Kyoto, Japan

**Mechanical Properties and Analysis of CF Hybrid Flat Braided Composites**, Y. Kobayashi, Y. Sasaki, A. Ohtani, A. Nakaim, Kyoto Institute of Technology, Kyoto, Japan

**Internal Structure and Mechanical Properties of Braided Composite Tube**, A. Ohtani, A. Nakai, H. Hamada, Kyoto Institute of Technology, Kyoto, Japan

**Impact Properties of CF/AF Fiber Hybrid Composite for Automobile Applications**, I. Nakabayashi, K. Kosuge, DU PONT-TORAY, Tokyo, Japan; A. Afflard, Ecole Mines de Douai, Douai Cedex, France; N. Shikamoto, T. Sugie, A. Nakai, H. Hamada, Kyoto Institute of Technology, Kyoto, Japan

**The Manufacturing of Flange of Three-Dimensional Braiding Composite**, B. Tang, X. Dan, Q. Yiping, Donghua University, Shanghai, China

## Durability, Impact and Damage II

**Session Chair: Shawn Walsh, Army Research Laboratory, Aberdeen, MD**

**Evaluation of Functionally Graded Foam Crushability in Confinement under Moderate Strain Rate Using a Drop-Weight Machine**, B. O'Toole, M.K. Hossain, Q. Liu, University of Nevada, Las Vegas, Las Vegas, NV

**Synthesis and Mechanical Properties of Shear Thickening Fluid/Kevlar Composite for Body Armor Application**, V.K. Rangari, T.A. Hassan, S. Jeek Jeelani, Tuskegee University, Tuskegee, AS

**High Velocity Impact Testing and Simulation of Thermoplastic Composite Laminates**, U. Vaidya, L. Deka, University of Alabama at Birmingham, Birmingham, AL; S. Bartus, Army Research Laboratory, Aberdeen, MD

**Controlled-Fragmentation of a Composite Artillery Shell**, R. Ebersson, M. Minnicino, US Army Research Laboratory, Aberdeen Proving Ground, MD

**Impact Loading and Damage Identification Using Minimal Dynamic Sensing Strategies**, D. Adams, B. Zwink, N. Yoder, Purdue University, West Lafayette, IN

**The Emergence of Thermoplastic Composite Materials Through Cost-Effective Molding Techniques**, V. Brachos, V. Borbone, Diaphorm Technologies, LLC, Salem, NH

**The Development of UHMWPE Prototype Helmets for Improved Ballistic Mass Efficiency**, S.M. Walsh, B. Scott, ARL, Aberdeen Proving Ground, MD

**Hybrid Thermoplastic Composite Ballistic Helmet Fabrication Study**, Tom Campbell, David Cramer, Fiberforge, Glenwood Springs, CO

## Civil/Infrastructure II

**Session Chairs: David W. Jensen, The Boeing Company, Seattle, WA and Vistas Karbhari, University of California San Diego, La Jolla, CA**

**Effect of Fly Ash Content in Cement Stabilized Soil Blocks**, P. Partasivamurthy, S.C. Sharma, C.S. Chandrashekara Murthy, R.V. College of Engineering, Bangalore, India; B.V. Kiran Kumar, D.S. College of Engineering, Bangalore, India

**Emergency Repair Design of Circular Bridge Columns Using FRP: A Decision Tree**, S. Slater, V.M. Karbhari, University of California, San Diego, La Jolla, CA

**Calibration of Preliminary Resistance Factors for the Load and Resistance Factor Design (LRFD) of Prefabricated FRP Composites for FRP Rehabilitation of Concrete**, S.-J. Jin, V.M. Karbhari, University of California, San Diego, La Jolla, CA

**Evaluation of Prefabricated FRP Structural Formwork Bridge Deck Systems**, A.B. Pridmore, V.M. Karbhari, University of California, San Diego, CA

**Performance Impact of Fumed Silica on CFRP Concrete Column Jackets**, D. Phillippi, G.A. Hegemier, University of California, San Diego, La Jolla, CA

**Impact Loading on CMU Walls Strengthened with CFRP Composites**, A. M. McComb, D. Lijuan Cheng, University of California, Davis, Davis, CA

**Long-Term Integrity of Epoxy-Bonded Rebar Couplers**, G. Brungraber, V. Karbhari, University of California, San Diego, La Jolla, CA

## Design and Analysis III

**Session Chair: Dewayne Howell, Peak Composites Inc., Arvada, CO**

**Numerical Model to Predict the Limiting Bond Strength in a Steel Cord Thermoplastic Composite**, C.B. Ochoa, U. Vaidya, UBA University of Alabama at Birmingham, Birmingham, AL

**Process Integration and Multi-Objective Design Optimization as New Design Methodologies for Composite Structures**, A. Bassanese, M. Ozen, Ozen Engineering Inc., Sunnyvale, CA; F. Micchetti, Enginsoft, Mesagne, Italy; H. Katajisto, A. Mönicke, Componeering, Inc., Helsinki, Finland

**The Design, Analysis and Fabrication of a Large Cantilevered Composite Boom**, J. M. Lawrence, S.T. Holmes, V System Composites, Chester, PA; T. McKeown, V. Keenan, Orbit/FR Inc., Horsham, PA

**Virtual Crack Closure Finite Element Model for Predicting Fracture Failure in Marin Grade FRP**, F. El-Chiti, R. Lopez-Anido, E. Landis, University of Maine, Orono, ME; L. Thompson, Applied Thermal Sciences, Inc., Sanford, ME; E. Thibodeau, Hopper Dennis Jellison, PLLC, Beaverton, OR; B. Jones, Naval Surface Warfare Center, West Bethesda, MD

**Effects of Clamping Force, Viscoelasticity and External Static and Vibratory Loads On Relaxation in Bolted Composite Joints**, R.F. Gibson, S.D. Thoppul, R.A. Ibrahim, Wayne State University, Detroit, MI

**Experimental/Numerical Approach to Determine Constitutive Laws of Composite Materials**, D. Huang, Brigham Young University, Provo, UT; D. Cairns, Montana State University, Bozeman, MT

**Statistical Methods in Quality Control of Composites**, S. Wilding, K. Stevens, D. Fullwood, B. Adams, Brigham Young University, Provo, UT

**Two Parameter Approximation to the Orthotropic Stress Concentration Factor**, B.D. Esp, W.S. Chan, University of Texas at Arlington, Arlington, TX

**Creep Testing of High Performance Materials for Inflatable Structures**, S. Scarborough, T. Fredrickson, D. Cadogan, G. Baird, ILC Dover, LP, Frederica, DE

## Electrical Properties of Composites/Nanocomposites

*Session Chairs: Jennifer Chase Fielding and Brandon Black, Air Force Research Laboratory, WPAFB, OH*

**Carbon Nanofibre/Polypropylene Composites by Tailored-Shear Extrusion**, F.W.J. van Hattum, IPC - Institute for Polymers and Composites, Guimaraes, MH

**Thermal and Electrical Conductivities Characterization of CNF-Modified Glass Fiber/Polyester Composite**, K.-T. Hsiao, R.L. Clark III, M. Skinner, B. Farah, J. Farris, M.R. Parker, University of South Alabama, Mobile, AL

**Nano-reinforced Composites with Tailored Electromagnetic and Mechanical Functionality**, T.A. Plaisted, A. Small, F. Davis, L. Sterner, Luna Innovations, Inc., Blacksburg, VA

**Experimental Study of EMI Shielding Property of Nanotube and Nanofiber Buckypaper Materials**, Z. Liang, J. Louis, J. Gyn Park, C. Zhang, B. Wang, FAMU-FSU College of Engineering, Tallahassee, FL; J. Brooks, Florida State University, Tallahassee, FL; L. Kramter, P. Funchess, Lockheed Martin Missiles and Fire Control-Orlando, Orlando, FL

**A Concurrent Solution for Both Lightning Strike and Electromagnetic Protection of Aerospace Composites (ITAR)**, G. Hansen, Metal Matrix, Midway, UT

**Highly Conductive Non Woven Paper (ITAR)**, G. Hansen, J. Burghardt, Metal Matrix, Midway, UT

**Electrically Conductive Structural Adhesive with Milliohm Resistance**, N. Hansen, L. Hansen, Metal Matrix, Midway, UT

**In-situ Fabrication of Metal Nanoparticle Reinforced Poly(P-Phenylenebenzobisthiazole) Nanocomposite**, S. Wei, Z. Guo, H. Thomas Hahn, UCLA, Los Angeles, CA

## Space Structures

*Session Chair: Ed Silverman, Northrop Grumman, Redondo Beach, CA*

**Radiation Effectiveness of Polymeric Based Shielding Materials at Low Earth Orbit**, F.F., Badavi, Christopher Newport University, Hampton, VA; C.R. Stewart-Sloan, Stanford University, Stanford, CA; J.W. Wilson, NASA Langley Research Center, Hampton, VA; D.O. Adams, University of Utah, Salt Lake City, UT

**Venting Analysis of Space Telescopes During Launch**, J. Devaud, Ball Aerospace and Technology Corporation, Boulder, CO

**Evaluation of High Thermal Conductivity PMCs for Advanced Space Radiators**, E.E. Shin, Ohio Aerospace Institute, Cleveland, OH

**Process Simulation of Fiber Reinforced Plastics for Space Satellites**, T. Ozaki, M. Kume, K. Sekine, Mitsubishi Electric Corporation, Japan; T. Kino, Institute for Unmanned Space Experiment Free Flyer, Japan

**Design of a Composite Lidar Enclosure for the Phoenix Mars Mission**, P.D.D. Roberts, MDA, Brampton, Canada

## Japanese Market Trends in Fibers and Composites

*Session Chair: Toshio Tanimoto, Shonan Institute of Technology, Kanagawa, Japan*

**10KW Small Wind Turbine Systems Development by Composite Structure**, Invited Presenter: Gaku Kimura, GH Craft Ltd., Shizuoka, Japan

**The Current and Future Status of the PAN-Based Carbon Fiber Industry**, Invited Presenter: Steven Carmichael, Mitsubishi Rayon Company, Japan

**High Performance Pitch Based Carbon Fibers and Their Application**, Invited Presenter: Hideyuki Ohno, Nippon Graphite Fiber Corporation, Tokyo, Japan

**New Spread Technology for Carbon Fiber Tow and Its Application to Composite Materials**, Invited Presenter: Kazumasa Kawabe, Industrial Technology Center of Fukui Prefecture, Fukui, Japan

**Advanced Composite Parts and Structures for Space Satellites**, Invited Presenter: Tsuyoshi Ozaki, Mitsubishi Electric Corporation, Kanagawa, Japan

**Forecast of the Growing Future Composites Industry**, Invited Presenter: Kenji Iizuka, Iizuka Teckno System, Kyoto, Japan

## 2008 Seminar on Composite Material Handbook 17

Composite Material Handbook 17's (CMH-17) mission is to develop world-class engineering information, including databases, standards and guidelines for structural applications of composite materials. The handbook has developed a seminar to make these advances visible to potential users. This seminar starts with an introduction to the six volumes then highlights some of the newest content of the handbook and provides a status in areas where significant changes are occurring. The seminar discusses the use of the handbook for different validation and development processes that are documented in the handbook. It will discuss the statistical methods used and then review considerations for specialized applications which require unique approaches to data development. Experts from CMH-17 leadership will make presentations in the seminar.

A summary of topics to be presented follows:

- Introduction, Overview and History of CMH-17
- Highlights from Expanded Volumes on Metal Matrix, Ceramic Matrix and New Volume on Sandwich Composites
- Composite Roadmaps for Navigation of the CMH-17 Handbooks
- Statistics for Generation of Materials Allowables
- Building Block Approach to Structural Development and Substantiation
- Considerations for Specialized Data Development

To review more detailed information on the CMH-17 seminar for this year, please visit: <http://www.cmh17.org/sampe.htm>.

\*Cost: \$200 (includes handouts and a CMH-17 membership for 16 months, allowing access to the member's only website that contains the DOD-approved version {Rev. F} and most recent drafts of the handbooks, which are fully approved through CMH-17 coordination group.)

8:00 AM - 12:00 PM

## Natural Materials I

**Session Chair: Danny O'Brien, US Army Research Lab, Aberdeen Proving Ground, MD**

**Natural Composite Materials for Aerodynamically Loaded Structures: A South African Perspective**, S. Szewczuk, CSIR Built Environment, Pretoria, South Africa

**Characterization of Novel Biocomposites Developed Through Sandwich Injection Molding**, S. Sahoo, Asami Nakai, Kyoto Institute of Technology, Kyoto, Japan

**Influence of Material Parameters on the Mechanical Properties of Extruded Sisal Fibre-Polypropylene Composites**, S. Rao, D. Bhattacharyya, K. Jayaraman, Centre for Advanced Composite Materials, Auckland, New Zealand; A. Fernyhough, Scion, Rotorua, New Zealand

**Rotational Moulding with Water-Free Thermoplastic Starch/Polyethylene Blends**, P. Lescher, K. Jayaraman, D. Bhattacharyya, Centre for Advanced Composite Materials, Auckland, New Zealand

**Characterization of Polypropylene Composites Reinforced with Modified Lignocellulosic Fiber**, C.A. Ulven, M. Fuqua, North Dakota State University, Fargo, ND

**Mechanical Characterization of Compression Molded Flax Fiber Reinforced Rigid Polyurethane Foam Composites**, C.A. Ulven, D. Huotari, M. Hanson, North Dakota State University, Fargo, ND; D. Kottke, SpaceAge Synthetics, Inc., Fargo, ND

**Extrusion Foaming of Natural Fiber Composites with a Blowing Agent**, G. Guo, University of Southern California, Los Angeles, CA; G.M. Rizvi, University of Ontario Institute of Technology, Oshawa, Ontario, Canada; C.B. Park, University of Toronto, Toronto, Canada

**Characteristics and Applications of Cocos Nucifera Fibre - The Golden Fibre from the God's Own Country**, F. Varghese, M. Kumara Raja, Govt. of India, Cochin, India

## Advancements in Nondestructive Evaluation I

**Session Chair: Brad Lucht, Independent Consultant, Kansas City, MO**

**Strength Evaluation of Sewer Liner Material Via Ultrasonic Testing**, F.Y. Lin, City of Los Angeles, Arcadia, CA

**Fiber Bragg Gratings for Crack Growth and Thermal Monitoring**, R.J. Black, B. Moslehi, L. Oblea, K. Sourichanh, Intelligent Fiber Optic Systems Corporation, Santa Clara, CA; S. Sathish, University of Dayton Research Institute, AFRL/RXLP, Dayton, OH; K. Jata, C. Nelsen, Air Force Research Laboratory, AFRL/RXLP, Wright Patterson AFB, OH

**Ultrasonic Nondestructive Inspection of Aerospace Composite Materials and Structures Using Next Generation Acoustography**, J.S. Sandu, W. J. Popek, Santec Systems, Inc., Wheeling, IL; C. Pergantis, US Army Research Laboratory, Aberdeen Proving Ground, MD

**In Situ Electrokinetic Assembly of Acrylic and Pozzolanic Nanoparticle Phases within Concrete**, A. Kurukunda, H. Cardenas, Y. Lvov, Louisiana Tech University, Ruston, LA

**Measurement of Resin Flow in VBO Prepregs by Ultrasonic Imaging**, S. Thomas, C. Bongiovanni, S.R. Nutt, University of Southern California, Los Angeles, CA

## Civil/Infrastructure III

**Session Chairs: David W. Jensen, The Boeing Company, Seattle, WA and Vistas Karbhari, University of California San Diego, La Jolla, CA**

**Analytical Model for Predicting CFRP Square Concrete Column Jacket Strains**, D. Phillippi, G.A. Hegemier, University of California, San Diego, La Jolla, CA

**In Situ Electrokinetic Assembly of Acrylic and Pozzolanic Nanoparticle Phases within Concrete Masonry Units**, A. Kurukunda, H. Cardenas, Y. Lvov, Louisiana Tech University, Ruston, LA

**Creep and Fatigue Behavior of Hybrid FRP-Concrete Bridge Deck**, A.J. Aref, P.B. Coronel, University at Buffalo, Buffalo, NY

**Calibration of Resistance Factor in Designing CFRP Strengthened Circular Concrete Columns**, Z. He, Northeastern University, Shenyang, China; D. Zhang, Harbin Institute of Technology, Harbin, China

**Discussions on the Effect of In-Situ Confinement on the Behavior of FRP-Confined Concrete Columns**, Z. He, Northeastern University, Shenyang, China

**Case Studies for Strengthening Concrete Structures Using Externally Bonded FRP Systems**, T. Alkhrdaji, J. Thomas, Structural Group, Hanover, ML

**A Hybrid Strengthening System for the Rehabilitation of Reinforced Concrete**, C. Papakonstantinou, K. Katakalos, University of Massachusetts Dartmouth, North Dartmouth, MA

## Nanoscale Performance and Processing I

**Session Chair: Art Fritts, Nano Sperser LLC, Akron, OH**

**Effects of Core-Shell Nanoparticles on Fracture Toughness in Rubber-toughened Epoxies at Cryogenic Temperature**, J. Wang, S.A. Cannon, J.A. Schneider, Mississippi State University, Starkville, MS

**Thermally-Conductive, Erosion-Resistant Nanocomposite Elastomeric Boot**, R.F. Kovar, J. Player, S. Armstrong, Infoscitex Corporation, Waltham, MA; G. Beall, Texas State University, San Marcos, TX

**Fabrication and Evaluation Of Montmorillonite Nanoclay Reinforced Epoxy Composites**, S. Salekeen, M.G.K. Khan, S. Jeelani, Y. Zhou, Tuskegee University, Tuskegee, AL

**Processing of Polymer Nanocomposites Using Thinky Mixer**, J.H. Koo, S. Lao, T. Moon, B. Hadisujoto, J. Malinoff, H. Jor, W. Yong, The University of Texas at Austin, Austin, TX

**CNF/HDPE Composites by Tailored-Shear Extrusion**, C. Leer, P. Lake, Applied Sciences, Inc., Cedarville, OH; R. Gupta, S. Agarwal, E. Kennel, West Virginia University, Morgantown, WV; F. van Hattum, O. Carneiro, Institute for Polymers and Composites, University of Minho, Guimarães, Portugal

**Thermoplastic Polyurethane Elastomer Nanocomposites: Characterization and Thermophysical Properties**, J.H. Koo, W. Kit Ho, O. A. Ezekoye, The University of Texas at Austin, Austin, TX

**Development and Characterisation of High Performance, Fibre Reinforced Nanocomposites**, L. Torre, J.M. Kenny, R. Petrucci, University of Perugia, Terni, Italy

**Epoxy Functionalized Carbon Nanofibers and Their Nanocomposites**, W. Liu, B. Rice, D. Klosterman, University of Dayton Research Institute, Dayton, OH

## Thermoplastics

**Session Chairs: Mick Buck, TenCate - Phoenix TPC, East Taunton, MA; and Arnt Offringa of Stork Fokker AESP, Hoogeveen, The Netherlands**

**Processing & Characterization of Continuous Fiber Reinforcements Co-molded with Long Fiber Reinforced Thermoplastics**, K.B. Thattai parthasarathy, U.K. Vaidya, S. Pillay, The University of Alabama at Birmingham, Birmingham, AL

**Materials and Manufacturing Processes of the Superbus**, A. Terzi, R. de Bie, W. Ockels, Delft University of Technology, Delft, The Netherlands

**Multi-Layer Thermoplastic Coating Systems to Resist Cathodic Disbondment**, C.T. Love, Y. Cheng, V.M. Karbhari, University of California, San Diego, La Jolla, CA

**In-situ Consolidation of Thermoplastic Composite Structures**, D. Hauber, R. Langone, J. Martin, Automated Dynamics, Schenectady, NY

**High Strength ZenTron Fiber as Alternative to Carbon in LFTP Molding Compounds**, T.A. Chenock, Jr., M. Rosenow, AGY, Aiken, SC

**Mechanical Properties of Long Fiber Reinforced Injection Moldings**, Y. Takai, Y.W. Leong, A. Nakai, H. Hamada, Kyoto Institute of Technology, Kyoto, Japan; C. Le Lagadec, Ecole des Mines de Douai, Douai Cedex, France; N. Jumonji, T. Morii, Shonan Institute of Technology, Kanagawa, Japan

**Multifunctional, Multilayer, Transparent High Impact Structures by Coextrusion and Lamination**, W. Zhang, Institute for Advanced Learning and Research, Danville, VA; R.D. Moffitt, Virginia Polytechnic Institute and State University, Danville, VA; J. Sands, Army Research Laboratory, Aberdeen Proving Ground, MD

**Manufacture of High Performance Thermoplastic Composite Structures**, A. Wood, D. Padey, J. Walling, Victrex PLC, Thornton Cleveleys, UK; R. Lenferink, Ten Cate Advanced Composites BV, Nijverdal, Netherlands, R. Day, J. Bennett, A. Nesbitt, Northwest Composites Centre, University of Manchester, Manchester, UK

**Influence of Surface-Modification of Polypropylene Fibers on Material Properties of PP-VE Composites**, Y. Liang, G.R. Palmese, Department of Chemical and Biological Engineering, Drexel University, PA; E.J. Robinette, R. Jensen, U.S Army Research Laboratory, Aberdeen Proving Grounds, MD

**Epoxy Functionalized Carbon Nanofibers and Their Nanocomposites**, J. Yim, A. Fridman, G.R. Palmese, Drexel University, Philadelphia, PA; D.D. Pappas, USARL, APG, MD

## Tooling, Repair and Affordability

**Session Chair: Mark Kistner, Air Force Research Laboratory, Dayton, OH**

**Case Studies of Large Carbon Foam Tooling**, R.D. Lucas, H.E. Danford, Touchstone Research Laboratory, Ltd., Triadelphia, WV

**Creep Behavior of a Porous State-Change Material at Ambient and Elevated Temperatures**, B. O'Toole, S. Nelson, J. Thota, University of Nevada Las Vegas, Las Vegas, NV

**Deformation of Elastic Membrane Used in a Reconfigurable Tooling System**, T. Rivera, S.-Y. Luo, University of Nevada, Reno, NV; L. Clements, 2Phase Technologies, Dayton, NV

**Large Area Composite Acoustic Facing Repair on a Thrust Reverser Inner Wall**, J.M. Welch, Spirit AeroSystems, Wichita, KS

**Development of Remendable Materials with Diels-Alder Chemistry**, A.M. Peterson, G.R. Palmese, Drexel University, Philadelphia, PA; R.E. Jensen, US Army Research Laboratory, Aberdeen Proving Ground, MD

**Affordable Automation for Engineered Composite Structures**, J.P. Martin, D. Hauber, Automated Dynamics, Schenectady, NY

**Innovative, Low-Cost Manufacturing of a Wing-Box Section**, F.W.J. van Hattum, PIEP-Innovation in Polymer Engineering, Guimaraes, Portugal; M.L. Labordus, Lightweight Structures B.V., Delft, The Netherlands

**Hybrid Tooling System for Advanced Composite Structure**, T. Sobcinski, Remmele Engineering Inc., New Brighton, MN

## Process Development and Manufacturing I

**Session Chair: Brendan O'Toole, University of Nevada - Las Vegas, Las Vegas, NV**

**Thermally Conductive Silicon Nitride Reinforced LLDPE Composites**, Q. An, S. Qi, Northwestern Polytechnical University, Xi'an, China; W. Zhou, Xi'an Jiaotong University, Xi'an, China

**ATL Design Tool for Tow Path Optimization**, J. Wyatt, Hossein Haj-Hariri, University of Virginia, Charlottesville, VA; M. Gruber, Accudyne Systems, Inc., Newark, DE

**Influence of Air Release Additive on Vacuum-Bag Curable Prepreg**, B. Zhang, X. Chen, Beijing Institute of Aeronautical Materials, Beijing, China

**Structural Reaction Injection Molding of Polydicyclopentadiene**, N. Hoekstra, E. Lao, Western Washington University, Bellingham, WA

**Fabrication and Testing of Orthotropic and Extreme Poisson's Ratio Elastomer Composites**, L.D. Peel, A. Koether, N. Ramiah, D. Grant, Texas A&M University - Kingsville, Kingsville, TX

**Manufacturing/Design Integrated Simulation for Composite Material Parts**, P. de Luca, F. El Khaldi, ESI Group, Rungis, France

## UAV/UCAV

**Session Chairs:** Valeria La Saponara, UC Davis, Davis, CA and Larry D. Peel, Texas A&M University, College Station, TX

**Low Cost Carbon Epoxy Pultruded Wings for UAVs**, N. Gravelle, S. Tremblay, KaZaK Composites, Inc., Woburn, MA

**Advancement of UAV Technology Through Composite Structures**, P. Roysdon, Composite Engineering, Inc. Sacramento, CA

**Rapid Prototype Development of a High Speed, Blended Wing UAV**, P. Roysdon, Composite Engineering, Inc. Sacramento, CA

**Composite Applications to the Swift Killer Bee UAV**, M. Page, Swift Engineering, San Clemente, CA

**Quad Tilt Wing: QTW VTOL UAV, all CF Composite Structure Development**, G. Kimura, GH Craft Ltd., Shizuoka, Japan

1:00 PM - 5:00 PM

## Natural Materials II

**Session Chair:** Bill Pratt, Patterned Fiber Composites Inc., Cedar City, UT

**Dry, Resin Impregnate-able Natural Fiber Fabric Reinforcements**, J. Biron, SciArt, Inc., Drummondville, Canada; V. Bailey, SciArt, Inc., Laguna Niguel, CA; C. Calfee, Calfee Design, Inc., La Selva Bach, CA

**Enhancement in Mechanical Properties by Improving Fiber/Matrix Adhesion in Bio-Based Polyurethane/E-Glass Composites**, J.S. Tate, J. Massingill, S. Arabie, S. Konga, Texas State University - San Marcos, San Marcos, TX

**Basalt Fibers as New Composite Reinforcement**, P. Foskett, E.T. Horn Company, La Mirada, CA

**Starch-Clay-Polylactic Acid Composites**, Invited Speaker: S. Chirachanchai, Chulalongkorn University, Bangkok, Thailand

**Processing and Mechanical Properties of Jute reinforced PLA Composite**, A. Nakai, N. Shikamoto, A.Ohtani, Yew Wei, Kyoto Institute of Technology, Kyoto, Japan

**Preparation of Smart Composite Materials in Biopolymer Network**, Invited Speakers: T. Yamauchi, S. Obara, N. Tsubokawa, Nigata University, Japan

**Biocomposites and All Green Composites: Recent Developments and New Directions of Research**, Invited Speaker: A.K. Mohanty, Michigan State University, East Lansing, MI

**Possibilities to Improve the Mechanical Properties of Seaweed Polypropylene Composites: Effect of Maleic Anhydride Treatment**, M. Masudul Hassan, MC College of National University, Bangladesh, India; M. Mueller, M.H. Wagner, Technical University of Berlin, Fasanenstr, Berlin

**Fabrication of Soy Oil Epoxy Resin Based High Strength Composites**, R. Seemamahannop, V. Pai, V. Flanigan, S. Kapila, University of Missouri-Rolla, Rolla MO

## Advancements in Nondestructive Evaluation II

**Session Chair:** Brad Lucht, Independent Consultant, Kansas City, MO

**Correlation of the Material States During Cure for Carbon Fiber/Epoxy Prepregs Using Encapsulated Sample Rheometer and Modulated Temperature Differential Scanning Calorimetry**, P. Kashani, S. Soltani, F. Ghods, A. Rodriguez, B. Minaie, Wichita, KS

**Ultrasonic Evaluation for Long Time used GFRP Tanks**, Y. Fujii, S. Mabuchi, T. Morita, Kyoto Institute of Technology, Japan

**Residual Property Evaluation of Fiber Reinforced Plastics by Acoustic Emission**, T. Morii, T. Horie, Shonan Institute of Technology, Kanagawa, Japan; H. Hamada, Kyoto Institute of Technology, Japan

**Study on Non-destructive Inspection Technologies for VARTM Composite Structure**, Y. Aoki, S. Sugimoto, Y. Hirano, Y. Nagao, APG/Japan Aerospace Exploration Agency, Japan

**Laser-Induced Fluorescence Based Non Destructive Evaluation of Heat Damaged Aircraft Composites**, R.J. Meilunas, S. Ng, NAVAIR, Patuxent River, MD; W. Fischer, Galt Technologies, Knoxville, TN; C. Janke, Oak Ridge National Lab, Oak Ridge, TN

## Alternative Energy/Wind

**Session Chair:** Doug Cairns and Moe Khaleel, PNNL, Richland, WA

**Engineered Sandwich Cores for Large Wind Turbine Blades**, F. Stoll, R. Banerjee, WebCore Technologies, Inc., Miamisburg, OH

**Composite Materials Issues in Wind Turbine Blade Construction**, J.F. Mandell, D.D. Samborsky, P. Agastra, Montana State University, Bozeman, MT

**Integration of Thin-Film Solar and Energy Cells in Multifunctional Structural Composites for Energy Harvesting**, T. Pereira, S. Nieh, H.T. Hahn, University of California Los Angeles, Los Angeles, CA

## Metals and Ceramics

**A Review of Some Electrical and Optical Properties of UO<sub>2</sub> and U<sub>3</sub>O<sub>8</sub>**, T.T. Meek, University of Tennessee, Knoxville, TN; B. vonRoedern, NREL, Golden, CO

**Effect of 'Pressure' on Ceramic Reinforced Aluminium Alloy During and After Solidification**, K.R. Suresh, Bangalore Institute of Technology, Bangalore, India; H.B. Niranjana, SEA College of Engineering and Technology, Bangalore, India; M.P. Jebaraj, Dr. Ambedkar Inst. of Technology, Bangalore, India; M.P. Cowdiah, Center for Agine Manufacturing, **Effects of Process and Materials on Pressureless Sintering of Alumina**, O.L. Ighodaro, O.I. Okoli, FAMU-FSU College of Engineering, Tallahassee, FL

**Investigation of Surface Growth on TiO<sub>2</sub> Particles**, L. Zeatoun, Jordan University of Science and Technology, Irbid, Jordan; D. Feke, Case Western Reserve University, Cleveland, OH

**Synthesis, Structure and Electronic Properties of Phase Change Material Sb<sub>55</sub>Se<sub>45</sub>**, R.S. Kumar, N. Reddy, A. Cornelius, R. Venkat, University of Nevada Las Vegas, Las Vegas, NV

**Experimental/Numerical Studies of Macromechanical and Micromechanical Behavior of Friction Stir Welded Aluminum Joints**, S.D. Thoppul, R.F. Gibson, Wayne State University, Detroit, MI

**Effect of Reflow Process Parameters on Microstructure of Pb-Free Solder Materials**, L. Ladani, Utah State Univ, Logan, UT

**The Role of Vacuum Level in the Vacuum Induced Preform Regulation (VIPR) Process**, J. Alms, J.L. Glancey, S.G. Advani, Department of Mechanical Engineering and Center for Composite Materials, Univ of Delaware, Newark, DE

## Nanoscale Performance and Processing II

**Session Chair: Art Fritts, Nano Sperse LLC, Akron, OH**

**Morphology of Carbon Nanofiber-Reinforced Thermoplastic Polyimide Films**, C. Heitkamp II, D. Klosterman, University of Dayton Research Institute, Dayton, OH

**Polymer Nanocomposites with Tunable Magnetic Properties**, Z. Guo, H. Thomas Hahn, UCLA, Los Angeles, CA; D.P. Young, LSU, Baton Rouge, LA

**Optical Transmittance of Carbon Nanotube Film Integrated Organic Solar Cells**, R. Liu, S. Wang, Texas Tech University, Lubbock, TX

**Incorporation of Carbon Nanotubes into Polymer Composites Through m-Chloroperbenzoic Acid Induced Epoxidation**, S. Wang, R. Liu, Texas Tech University, Lubbock, TX

**Ionomer-Nanoclay Nanocomposites**, W. Zhang, Institute for Advanced Learning and Research, Danville, VA; R.D. Moffitt, Virginia Polytechnic Institute and State University, Danville, VA; R. Beyer, AMSRD-ARL-WM-MA, Aberdeen Proving Ground, MD

**Conductive Resins Made with Carbon Nano Fibers for use in Lead Acid Batteries**, J.F. Unser, E. Macarthy, K. Kelley, Firefly Energy Inc., Peoria, IL

**Simulating the Dispersion of Carbon NanoFibres in Polymer Composites**, O.S. Carneiro, M. Yamonoi, C. Leer, F.W.J. van Hattum, J.M. Maia, University of Minho, Guimaraes, Portugal

**Process Optimization and Mechanical Characterization of Multi-walled Carbon Nanotubes/Epoxy Composites**, M. Kim, O. Okoli, Y.-B. Park, Florida A&M University, Florida State University College of Engineering, Tallahassee, FL

## Process Development and Manufacturing II

**Session Chair: Brendan O'Toole, University of Nevada - Las Vegas, Las Vegas, NV**

**Automated Material Placement: 2008 Industry Overview**, D.A. McCarville, Boeing, Orting, WA; J.C. Guzman, Boeing, Seattle, WA; D.M. Rotter, Boeing, LFP, WA

**Development of New Bagging Films for use on Composite Structures**, B.R. Kitt, Spirit Aero Systems, Wichita, KS

**Process Acceleration by Selective and Volumetric Heat Transfer Methods**, I. Herbeck, M. Kleineberg, DLR, German Aerospace Center, Braunschweig, Germany

**Cost-Effective Surface Machining by Approximate Approach**, Z. Jianjun, P. Yuliang, Hangzhou Dianzi University, Hangzhou, China; Z. Nanjia, Pittsburg State University, Pittsburg, KS

**Magnetically Loaded Filament Wound Composites**, C. Haehl, B. Lively, D. Fullwood, Brigham Young University, Provo, UT

**Impact of a Faster Curing Process on Selected Properties of Carbon Fiber Pregreg Matrix Using an Industrial Microwave Process**, B.B. Balzer, J. McNabb, Indiana State University - College of Technology, Terre Haute, IN; T. Mensah, Georgia Aerospace, Inc., Atlanta, GA; D. Stienstra, Rose-Hulman Institute of Technology, Terre Haute, IN

## Pressure Vessels

**Design and Development of COPVS for High Pressure Cryogenic Storage**, J. Schneider, M. Dyess, C. Hastings, J Wang, Mississippi State University, Mississippi State, MS; T. DeLay, NASA, Marshall Space Flight Center, AL; J. Patterson, J. Noorda, HyPerComp Engineering, Inc., Brigham City, UT

**Achieving Optimum Cost Efficiency to Meet the DOE's Targeted Goals for Compressed Hydrogen Gas in Off-Board Tank Storage**, M. Olson, HyPerComp Engineering, Inc., Brigham City, UT

**10,000 psi Type IV Vessel for Automotive Hydrogen Storage**, S. Villalonga, CEA, Monts, France

**Historesis in Viscoelastically Responding Composite Pressure Vessels, Structures and Materials**, N.J. Greene, C.P. Keddy, M.E. Stevens, R.E. Lucero, NASA JSC White Sands Test Facility, Las Cruces, NM; J.C. Thesken, NASA Glenn Research Center, Cleveland, OH

**Visual Indications of Stress Rupture in COPVs**, T.B. Yoder, NASA JSC White Sands Test Facility, Las Cruces, NM

**High Hydrogen Gas Barrier Performance of Carbon Fiber Reinforced Plastic with Non-metallic Crystal Layer**, K. Yonemoto, Kyushu Institute of Technology, Kitakyushu, Japan

**Shearographic Inspection of an NDE Standard COPV**, R. Lucero, NASA JSC White Sands Test Facility, Las Cruces, NM

**Damage Analysis of Composite Vessel Under Impact Loading Using the Finite Element Method**, H. Yomoda, H. Inagi, S. Inagi, T. Kaneko, Toyota Motor Corporation, Aichi-ken, Japan; G. Donaghy, S. Ujihashi, Tokyo Institute of Technology, Tokyo, Japan

## Is Education Meeting the Training Needs of the Advanced Composite Industry?

**Panel Moderator: Jim Hatch, Ogden Weber Technology College, Ogden, UT**

In the rapidly expanding Advanced Composite World are educational institutions keeping pace with industry's needs for qualified scientists, engineers, and technicians and are they training and instructing to industry needs?

Panelists:

Donald W. Radford – Associate Professor of Mechanical Engineering at Colorado State University

Michael Hoke – President and Owner of Abaris, Reno, Nevada.

David Widauf – Colonel USAF (Retired), Professor Utah State University (Retired), presently is working at Hill Air Force Base, UT

\$150 with conference registration  
\$100 full time students  
\$175 all other registrations

## **Test Methods for Composites** • Don Adams, Wyoming Test Fixtures, Salt Lake City, UT

A solid introduction for the novice, this tutorial is a good refresher for the experienced individual working with composite materials and structures. Emphasis is on establishing the guidelines for the selection of a proper and meaningful test method for each specific application. Although some test methods have been standardized by various agencies and groups, many have not yet and are evolving as 'company standards' in recent years. Since composite materials characterization and testing can often be expensive, picking the correct test method and conducting the test properly is important. This popular tutorial summarizes test methods for composite materials and discusses the critical issues that are important to the composite end user. Some of the topics covered in this tutorial are:

- Proper test methods for specific applications
- Standard test methods – ASTM, SACMA, ISO, SAE, etc.
- Non-standard test methods discussion – where they fit
- Which composite properties are measured during testing
- Tests for random fiber, CSM, and unidirectional composites
- Tensile, compressive, shear, flexural, and other properties
- Special problems associated with fuels, temperature, water, long term, etc.

## **Nanocomposites Technology** • Joseph Koo, The University of Texas at Austin, Austin, TX and Louis Pilato, Consultant, Bound Brook, NJ

Nanotechnology and its unique features is best be described as an enabling technology that allows the introduction of unusually small amounts (~ 5 wt%) of nanomaterials into a polymer system leading to a "nanocomposite" with improved and multifunctional performance characteristics. A variety of nanoparticles is available, and these nanoparticles can be distinguished due to their respective shape/geometry.

Nanomodification of either thermoplastic or thermosetting resins leads substantial improvement in the performance characteristics of the resulting nanocomposite and offer promise of a variety of new composite, adhesive, coating, and sealant materials with unique properties not necessarily available with conventional materials.

Topics to be discussed in the tutorial are:

- type and shape of various nanoparticles such as nanoclays, carbon nanofibers, POSS, carbon nanotubes, silica, alumina, SiC, others.
- different polymers such as thermoplastic, thermosetting, and elastomer
- characterization of nanocomposite dispersibility
- polymer nanocomposite distinctive features (some or many)
  1. high strength, modulus
  2. improved  $T_g$ , fire resistance, moisture resistance, selective permeability
  3. selective electrical charge dissipation, thermal conductivity, clarity
- transformation of polymers into polymer nanocomposites in applications such as ablatives, coatings, fiber-reinforced composites, electronics, carbon-carbon composites, fire resistant materials, selective laser sintering, others.
- technology : current status, trends, new developments, economics, and some commercial applications

## **Filament Winding & Fiber Placement Technology** • Scott Beckwith, BTG Composites Inc., Taylorsville, UT

Filament winding (FW) and automated fiber placement (AFP) technologies have advanced considerably in the last 10-15 years in many ways. This tutorial will concentrate on providing an update of various materials, processing and applications technologies that are currently being used for FW and AFP manufacturing. Resin matrix materials and their forms, fiber types and the manner in which these two key ingredients are formed onto the part will be covered.

A handout and a CD ROM will be provided to attendees. Some of the various areas covered in this presentation are:

- What resins are typically used and what are their properties,
- What forms are the resin/fiber materials,
- What equipment variations are there,
- What parameters are important to each of the FW and AFP processes,
- Where does FW and AFP work best and why,
- What markets and applications best fit FW and AFP,
- What are some examples of composite products and applications, and,
- What are some of the design and processing factors that must be considered

## **Introduction to Composite Materials** • Carl Zweben, Consultant, Devon, PA

This tutorial provides an introduction to composites for those with a minimal background and those who desire to expand their knowledge. A basic overview will provide understanding of the four key classes of composites: polymer matrix, metal matrix, ceramic matrix and carbon matrix, with an overall emphasis on basic concepts and practical application. Participants should leave the tutorial with a basic understanding of composites and how they can be applied to the job. Designers, M&P engineers, analysts, shop personnel, technicals, students, managers, and sales and business development specialists can all benefit from this tutorial. Some of the topics covered are:

- Basic definitions and types of composites
- Key fiber reinforcements and matrix materials
- Properties of key composite material systems
- When composites should and should not be used
- Commercial and aerospace applications
- Lessons learned with composites

## **Resin Infusion/Liquid Molding Technology** • Dirk Heider, University of Delaware, Newark, DE

This tutorial reviews the various Liquid Composite Molding (LCM) processes, including Resin Transfer Molding (RTM), Vacuum Infusion Processing (VIP), and Structural Reaction Injection Molding (SRIM). These processes have been proven to manufacture high-performance parts while reducing costs compared to conventional autoclave processing. The tutorial will introduce the fundamental process physics and compare the benefits and disadvantages of the various implementations. The VIP process has been gaining popularity in recent years and thus will be a focus of this workshop. The tutorial will provide an overview of tooling and preform technology and review various industrial applications. Some of the topics which will be considered are:

- Basics of LCM processing
- Materials review including resin, fabrics and core materials used in the processes
- Overview of flow issues and modeling technology
- Tooling approaches often used
- Traditional preform technologies

## **Thermoplastic Composites** • Arnt Offringa, Stork Fokker AESP BV, The Netherlands

This tutorial will provide insight into what thermoplastic composites are, why they can be the material of choice and how they are applied in products. First, the characteristics of thermoplastics will be explained. Next, different high performance thermoplastic matrices will be described and compared. Then the unique manufacturing technologies possible with these materials, such as thermofolding, press-forming, welding and co-consolidation will be elaborated on. A number of successful aerospace applications, developed in a stepping-stone approach, will be reviewed. These will illustrate the technologies developed and design-to-cost choices made. Finally, a peek will be taken at the future and factors for successfully applying new technology will be reviewed. Some of the tutorial topics covered are:

- What are thermoplastics and why choose them?
- High performance thermoplastic matrices
- Continuous fiber reinforced thermoplastic composite material forms
- Overview of processing technologies
- Successful aerospace applications
- A peek into the Future
- Success Factors for new technology

## **Joining & Adhesives Bonding Technology** • Louis Dorworth, Abaris Training Resources Inc., Reno, NV

This tutorial examines the fundamental requirements for obtaining high quality, long-lasting adhesive bonds to fiber reinforced plastic structures. Much of the discussion focuses on the subtle, but important factors in joint design, differences in surface preparation techniques, levels of surface cleanliness, proper adhesive selection, what makes an adhesive wet-out (or not wet-out) on a surface, uniformity in bondline thickness, adequate bonding pressure, and assuring proper cure of the adhesive in the joint. The attendees will be encouraged to investigate new ideas and to scrutinize old habits.



## **Composites Fabrication Technology** • James Leslie, ACPT Inc., Huntington Beach, CA

One of our most popular tutorials! This course provides a comprehensive overview of the advantages offered by composite materials and the techniques by which they can be manufactured into useful structures and hardware components. An explanation of why composite materials are finding increased use in both commercial and aerospace applications is presented to the attendees. Attendees receive an in-depth review of the techniques used for the manufacture of composite structures. Some of the methods covered involve: filament winding, vacuum bagging, hand lay-up, pultrusion, resin transfer molding, compression molding, thermoforming, and various hybrid processes. Covered topics include:

- Extensive coverage of composites and FRP processing methods
- What processes and applications best fit together
- Illustrating "how-to" manufacturing logic with composites
- What composite materials (resins, fibers, forms) work best and when
- Selection criteria for picking resins and fibers for applications
- Discussion of auxiliary equipment and materials for processing
- Open forum for questions concerning today's manufacturing methods
- Extensive presentation of composite manufacturing processes and applications

## **Design, Analysis & FEA Modeling of Composites** • Dewayne Howell, Peak Composites Inc., Arvada, CO

This overview of composites design and analysis brings this complex subject down to earth. Industry accepted methodologies are introduced and practical examples are given to enhance the understanding of each topic. Emphasis is placed on guidelines for making composite design and analysis more effective. Participants will receive a handy Composites Design Guide as part of this experience. Various examples will be represented using commercially available closed form and finite element based software, and a brief overview of available software will be offered. Covered topics include:

- Constituent materials: fiber and matrix materials
- Micromechanics: combination of constituent materials forming a lamina and the resulting lamina properties
- Laminated plate theory: combining various lamina plies forming a multi angle stacked laminate and the resulting laminate material properties
- Laminate design guidelines: special laminates, stacking sequence, angle orientation, edge effects
- Laminate failure criteria: various criteria and their use
- Environmental considerations: humidity, fatigue, electromagnetic, temperature and other factors
- Joining methods & Design: mechanical and adhesive bonded joints
- Design of structures: Design philosophy, beams, plates, shells and sandwich structures
- Software for the D&A of Composite Structures: Example application of a drive shaft and other structures
- Finite element analysis of composite structures: The fine points of using FEA for composite analysis
- Software for FEA: Example application of a composite structure

## **Textile Composites Technology** • Hiroyuki Hamada and Asami Nakai, Kyoto Institute of Technology (KIT), Japan

Textile composites consist of textile reinforcements such as woven, knitted and braided fabrics and matrices. They have various advantages; high mechanical properties and high process abilities. In the case of unidirectional composites anisotropic nature is one of obstacle of applications and multilayer composites initiates the interlaminar fracture. Instead, textile composites can control the anisotropic properties and also 3-dimensional reinforcement configurations are enable. In actual applications fabrication methods of composites are very important because it can reduce the cost of composites drastically. A wide variety of layer stacking methods, as well as pultrusion, resin infusion (RTM, VARTM, SCRIMP, others) can be applied to the use of textile composites. This tutorial will cover these areas.

## **Carbon Fiber Technology** • Chris Levan, Carbon Fiber Solutions, Alpharetta, GA

This tutorial provides an extensive discussion and background into carbon/graphite fiber technology so that the attendee might understand how and where these materials might best be used in today's applications. The various processing differences between Rayon, PAN and Pitch based carbon fibers will be covered in sufficient detail to understand net property differences and processing challenges. The use of these fibers in conventional advanced composites and FRP applications using the various composites manufacturing techniques currently available will be covered. Issues, advantages, and disadvantages of these different materials forms and products will be covered. New applications and technology such as thermal management and large tow, lower cost will be covered.

- Overview of the history of carbon fiber technology
- Carbon/graphite fiber processing differences and resultant properties
- Differences between Rayon, PAN and Pitch Based Carbon Fibers
- Typical applications and properties of current carbon fiber forms and products
- New breakthroughs in thermal management technology and carbon/carbon applications
- Processing techniques used for carbon fiber forms: methods, issues, applications
- Processing techniques used for carbon fiber forms: methods, issues, applications
- Product cost and market application issues
- Applications of carbon fiber products throughout the aerospace/commercial industry

# General Information

## Registration

Save up to \$140 with Early Bird Registration. This discount is available through March 17.

- Payment in full must be made at the time of registration. Registration will not be processed unless payment accompanies the registration form. Acceptable forms of payment are cash, check or credit card (VISA, MasterCard, American Express, Discovery).
- Badges will not be mailed. All badges will be available for pickup on-site.
- We recommend that if your registration form and fee cannot be received at SAMPE by May 9, plan to register and pay on-site, to avoid problems at the registration counter.



## Registration Options

**Online:** Submit your registration online through our Secured Registration Process at [www.sampe.org](http://www.sampe.org). After you have completed your online registration, print out the confirmation, which will include a barcode, and bring it with you to the Registration Area onsite at the conference. This barcode will be scanned to provide you with expedited service when retrieving your badge and conference tickets.

For an additional \$25, you can use the following registration options:



**Phone:** +1.626.331.0616 ext. 610, 7:00 AM – 4:00 PM, Pacific Time, Monday through Friday (using credit card).



**Fax:** Fill out the registration form and fax to +1.626.332.8929, 24 hours a day using a credit card.



**Mail:** Send the completed registration form, with applicable funds to SAMPE, 1161 Park View Drive, Suite 200, Covina, CA 91724-3751.

## Cancellation/Refund/Substitution Policy

If you must cancel your registration for any reason, notify SAMPE in writing or by e-mail, by April 21. No cancellations can be accepted after that date. All registrations are subject to the cancellation policy. No telephone cancellations can be accepted.

Registrations cancelled prior to April 21 are subject to a \$100 service charge. Fees are refundable minus the \$100 service charge.

Registrants who fail to attend, and have not canceled as noted above are liable for the entire fee.

Refunds are not given for failure to attend, late arrival, unattended events or early departure from the meeting. Refunds are processed approximately 60 days after the meeting.

Substitutions can be made at any time, by letter, E-mail or Fax. The appropriate member/non-member rate will apply to attending substitutions. There is no charge for making a substitution.

## Make a Difference – Volunteer!

Help us out for half-a-day and you'll receive a half day complimentary registration.

Fill out the volunteer form at [www.sampe.org](http://www.sampe.org) to apply.

## ITAR Regulations – Restricted Papers

ITAR

Among other credentials needed, you MUST show proof of citizenship (most overlooked item). The U.S. citizens SAMPE list used at previous conferences will not be available. For more information about ITAR Clearance Requirements, visit the SAMPE '08 webpage at [www.sampe.org](http://www.sampe.org)

## Notes

- Attire at all events is business casual, with the exception of the Fellows Banquet, which is dressy.
- All presentations are in English.
- If you have a disability and require special needs, please note them on our registration form.

## Hotel Information

Hotel reservations for SAMPE '08 can be made on-line or by individual call-in.

The SAMPE group rate is guaranteed based on availability until April 18, 2008. A deposit equal to one night's stay is required to hold each reservation. Your deposit (room and tax) is non-refundable if one or more rooms are cancelled within 60 days prior to your arrival date.

**On-line Reservations:** For all on-line reservations go to the SAMPE '08 webpage at [www.sampe.org](http://www.sampe.org) and follow the on-screen instructions.

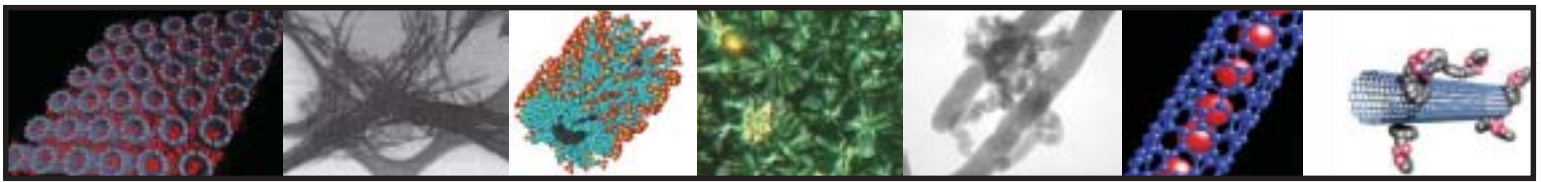
**Call-in Reservations:** Be sure to mention that you are with SAMPE or mention the group code to receive the SAMPE rate.

**Renaissance Hotel** \$169 (Single/Double)  
111 E. Ocean Blvd., Long Beach, CA 90802  
Direct Call-In: +01.562.437.5900  
Toll Free: +01.800.468.3571 (U.S. only)  
Group Code: samsama

**Westin Hotel** \$165 (Single/Double)  
333 East Ocean Blvd., Long Beach, CA 90802  
Direct Call-In: +01.562.436.3000  
Toll Free: +01.800.937.8461 (U.S. only)  
Group Code: SAMPE

**Hyatt Regency** \$175 (Single/Double)  
200 S. Pine Ave., Long Beach, CA 90802  
Direct Call-In: +01.562.491.1234  
Toll Free: +01.800.233.1234 (U.S. only)  
Group Code: SAMPE '08

**Courtyard by Marriott** \$132 (Single/Double)  
500 East First Street, Long Beach, CA 90802  
Direct Call-In: +01.562.435.8511  
Toll Free: +01.800.321.2211 (U.S. only)  
Group Code: samsama – Double Queens  
samsamb – Single King



## Conference Spotlight – Nanocomposites

# How can something so **big** be so small?

SAMPE '08 features a Nanotechnology Conference Track, offered at no additional cost with a full registration. These programs offer applications and insight into the nano industry, an industry experiencing constant growth and transformation. As such, it poses new challenges addressed by specially designed programs. Keep up with the ever-changing trends and technology and register today!

### **Tutorial\*** **Sunday, May 18**

**2:00 PM - 5:00 PM**

Nanocomposites Technology\*  
Joseph Koo, The University of Texas at Austin, Austin, TX and Louis Pilato, Consultant, Bound Brook, NJ

### **Monday, May 19**

**8:00 AM - 12:00 PM**

Analytical Characterization of Nanocomposites  
Session Chair: Peter T. Lillehei, NASA-LARC, Hampton, VA

### **Tuesday, May 20**

**1:00 PM - 5:00 PM**

Multiscale (Fiber Reinforced) Nanocomposite Performance  
Session Chairs: James Ly, Aerojet, Sacramento, CA and Sandi Miller, NASA Glenn Research Center, Cleveland, OH

### **Wednesday, May 21**

**8:00 AM - 12:00 PM**

Nanomaterials Synthesis and Processing  
Session Chair: Dickson Lao, University of Texas at Austin, Austin, TX

Nanotechnology - The Path from Development to Commercialization - Panel  
Panel Moderator: Max Lake, Applied Sciences Inc., Yellow Springs, OH

### **Thursday, May 22**

**8:00 AM - 12:00 PM**

Nanoscale Performance and Processing I  
Session Chair: Art Fritts, Nano Spense LLC, Akron, OH

**1:00 PM - 5:00 PM**

Nanoscale Performance and Processing II  
Session Chair: Art Fritts, Nano Spense LLC, Akron, OH

**\*Tutorial requires separate registration fee.**

