

# *Multifunctional Materials: Working Smarter Together*

## *Final Program and Exhibitor's Guide*

### *SAMPE Fall Technical Conference and Exhibition*

*Cook Convention Center, Memphis, Tennessee  
September 8-11, 2008*

#### *Co-located with*

- American Society for Composites Annual Technical Conference*
- ASTM D-30*



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# 2008 SAMPE Fall Technical Conference At-A-Glance

Monday, September 8 Registration 7:30 AM – 5:00 PM	Tuesday, September 9 Registration 7:30 AM – 5:00 PM	Wednesday, September 10 Registration 7:30 AM – 5:00 PM
<p><b>Tutorials</b> 9:00 AM</p> <ul style="list-style-type: none"> <li>• Design of Composite Aircraft Structures–<i>Room L3</i></li> <li>• Composites Fabrication Technologies–<i>Room L4</i></li> <li>• Introduction to Composite Materials–<i>Room L5</i></li> <li>• Mechanical Testing of Composite Materials–<i>Room L6</i></li> </ul> <p>*Session contains ITAR papers. <b>ITAR</b></p>	<p><b>SAMPE Keynote</b> 8:00 AM <i>Ballroom C&amp;D</i></p> <ul style="list-style-type: none"> <li>• Multifunctional Materials for Adaptive &amp; Autonomic Systems: An Overview</li> </ul> <p><b>Sessions</b> 9:15 AM</p> <ul style="list-style-type: none"> <li>• Nanocomposites: Processing 1A*–<i>Room Sultana-Mississippi</i></li> <li>• Design for Multifunctionality: Capability vs. Application 1A–<i>Room L12</i></li> <li>• Aerospace Structures &amp; Applications 1A*–<i>Room L3</i></li> <li>• Infrastructure Applications 1A–<i>Room L10</i></li> <li>• Manufacturing &amp; Processing Advances 1A–<i>Room L5</i></li> </ul> <p><b>Panel</b> 9:15 AM</p> <ul style="list-style-type: none"> <li>• Defense Applications of Multifunctional Materials–<i>Room L14</i></li> </ul> <p>10:30 AM Vendor Break</p> <p><b>Sessions</b> 11:00 AM</p> <ul style="list-style-type: none"> <li>• Nanocomposites: Processing 1B–<i>Room Sultana-Mississippi</i></li> <li>• Design for Multifunctionality: Capability vs. Application 1B–<i>Room L12</i></li> <li>• Aerospace Structures &amp; Applications 1B–<i>Room L3</i></li> <li>• Infrastructure Applications 1B–<i>Room L10</i></li> <li>• Manufacturing &amp; Processing Advances 1B–<i>Room L5</i></li> </ul> <p><b>Panel</b> 11:00 AM</p> <ul style="list-style-type: none"> <li>• Defense Applications of Multifunctional Materials–<i>Room L14</i></li> </ul>	<p><b>ASC Keynote</b> 8:00 AM <i>Ballroom C&amp;D</i></p> <p><b>Sessions</b> 9:15 AM</p> <ul style="list-style-type: none"> <li>• Nanocomposites: Applications 1A–<i>Room Sultana-Mississippi</i></li> <li>• Electromagnetic Multifunctional Materials 1A–<i>Room L12</i></li> <li>• Composite Fatigue &amp; Fracture 1A–<i>Room L3</i></li> <li>• Composites for the Automotive Industry 1A–<i>Room L10</i></li> <li>• Composites from Agricultural Products 1A–<i>Room L5</i></li> </ul> <p><b>Panel</b> 9:15 AM</p> <ul style="list-style-type: none"> <li>• Industrial Applications of Multifunctional Materials–<i>Room L14</i></li> </ul> <p>10:30 AM Vendor Break</p> <p><b>Sessions</b> 11:00 AM</p> <ul style="list-style-type: none"> <li>• Nanocomposites Applications 1B–<i>Room Sultana-Mississippi</i></li> <li>• Electromagnetic Multifunctional Materials 1B–<i>Room L12</i></li> <li>• Composite Fatigue &amp; Fracture 1B–<i>Room L3</i></li> <li>• Composites for the Automotive Industry 1B–<i>Room L10</i></li> <li>• Composites from Agricultural Products 1B–<i>Room L5</i></li> </ul> <p><b>Panel</b> 11:00 AM</p> <ul style="list-style-type: none"> <li>• Future Directions of Multifunctional Materials Research–<i>Room L14</i></li> </ul>

Exhibits Closed	Exhibits 10:00 AM – 4:00 PM	Exhibits 10:00 am – 4:00 pm
<p><b>Tutorials</b> 2:00 PM</p> <ul style="list-style-type: none"> <li>• Nanocomposites Technology–<i>Room L3</i></li> <li>• Thermoplastic Composites Technologies–<i>Room L4</i></li> <li>• Processing Science for Composite Structures Manufacturing–<i>Room L5</i></li> <li>• Damage Tolerance of Composites: Analysis &amp; Testing–<i>Room L6</i></li> </ul> <p><i>Tutorials require a fee separate from conference registration</i></p>	<p><b>Sessions</b> 2:00 PM</p> <ul style="list-style-type: none"> <li>• Nanocomposites Processing 2A–<i>Room Sultana-Mississippi</i></li> <li>• Nanostructured Multifunctional Materials 1A–<i>Room L12</i></li> <li>• Design for Multifunctionality: Capability vs. Application 2A–<i>Room L14</i></li> <li>• Infrastructure Applications 2A–<i>Room L10</i></li> <li>• Manufacturing &amp; Processing Advances 2A–<i>Room L5</i></li> <li>• Composite Design &amp; Analysis 1A–<i>Room L3</i></li> </ul> <p>3:15 PM Vendor Break</p> <p><b>Sessions</b> 3:45 PM</p> <ul style="list-style-type: none"> <li>• Nanocomposites Processing 2B–<i>Room Sultana-Mississippi</i></li> <li>• Nanostructured Multifunctional Materials 1B–<i>Room L12</i></li> <li>• Composite Design &amp; Analysis 1B–<i>Room L3</i></li> <li>• Manufacturing &amp; Processing Advances 2B–<i>Room L5</i></li> <li>• Environmental Considerations 1B–<i>Room: L10</i></li> </ul> <p><b>Committee Chairs Panel</b> 3:45</p> <ul style="list-style-type: none"> <li>• Reinventing Reality: The Quest for Multifunctional Material Properties–<i>Room: L14</i></li> </ul> <p><b>Welcome Reception</b> 5:00 PM</p> <p><b>Joint SAMPE/ASC Tribute to Tom Gates</b> 8:00 PM Memphis Room at the Marriott Hotel</p>	<p><b>Featured Lecture</b> 1:15 PM</p> <ul style="list-style-type: none"> <li>• Research on Multifunctional Materials &amp; Structural Health Monitoring in Japan–<i>Room L14</i></li> </ul> <p><b>Sessions</b> 2:00 PM</p> <ul style="list-style-type: none"> <li>• Composites for the Automotive Industry 2A–<i>Room Sultana-Mississippi</i></li> <li>• Thermo-Mechanical Multifunctional Materials 1A–<i>Room L12</i></li> <li>• Composite Fatigue &amp; Fracture 2A–<i>Room L10</i></li> <li>• NDE &amp; Structural Health Monitoring 1A–<i>Room L14</i></li> <li>• Composites from Agricultural Products 2A–<i>Room L5</i></li> <li>• Carbon-Carbon Composites &amp; Foams 1A–<i>Room L3</i></li> </ul> <p>3:15 PM Vendor Break</p> <p><b>Sessions</b> 3:45 PM</p> <ul style="list-style-type: none"> <li>• Nanocomposites: CNT/CNF Alignment 1B–<i>Room Sultana-Mississippi</i></li> <li>• Thermo-Mechanical Multifunctional Materials 1B–<i>Room L12</i></li> <li>• Composite Fatigue &amp; Fracture 2B–<i>Room L10</i></li> <li>• NDE &amp; Structural Health Monitoring 1B–<i>Room L14</i></li> <li>• Testing of Composites 1B–<i>Room L5</i></li> <li>• Carbon-Carbon Composites &amp; Foams 1B–<i>Room L3</i></li> </ul> <p><b>A Night at the Peabody</b> 6:00 PM Joint SAMPE/ASC Networking Social Event</p>

Thursday, September 11  
Registration 7:30 AM – 1:30 PM

## SAMPE Thanks Our Conference Sponsors!

### Featured Lecture 8:15 AM

- Ionic Polymer-Metal Composite: Soft Actuator & Sensor–Room L14

### Sessions 9:15 AM

- Nanocomposites: Electrical & Thermal 1A–Room Sultana-Mississippi
- Nanocomposites: Analysis & Characterization 1A–Room L12
- Thermoplastic Composites 1A–Room L5
- Sandwich Structures 1A–Room L10

### DoD Workshop 9:15 AM - 5:00 PM

- Structurally Integrated Energy Harvesting/Storage Capabilities–Room L3

### Panel 9:15 AM

- Requirements for the Next Generation of Composites Engineers–Room L14

10:30 AM Break

### Sessions 11:00 AM

- Nanocomposites: Electrical & Thermal 1B–Room Sultana-Mississippi
- Nanocomposites: Analysis & Characterization 1B–Room L12
- Thermoplastic Composites 1B–Room L5
- Sandwich Structures 1B–Room L10
- High Temperature Resins & Composites 1B–Room L14

\*Session contains ITAR papers.

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Exhibits Closed

### Featured Lecture 1:15 PM

- Polymer Nanocomposites Research in Canada–Room L14

### Sessions 2:00 PM

- Manufacturing & Processing Advances 3A\*–Room L5
- Nano-Industrial Applications 1A–Room Sultana-Mississippi
- Thermoplastic Composites 2A\*–Room L14
- High Temperature Resins & Composites 2A\*–Room L10
- Multifunctional Materials with Integral NDE 1A\*–Room L12

### DoD Workshop 9:15 AM - 5:00 PM

- DoD Workshop-Structurally Integrated Energy Harvesting/Storage Capabilities–Room L3

3:15 Break

### Sessions 3:45 PM

- Nanocomposites: Fire Behavior 1B–Room Sultana-Mississippi
- Thermoplastic Composites 2B–Room L14
- High Temperature Resins & Composites 2B\*–Room L10
- Joints in Composite Structures 1B\*–Room L5
- Resins & Adhesives 1B–Room L12



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September 1st - 12th, 2008

- ✦ Exhibitors are invited to post job opportunities
- ✦ SAMPE Job Seekers are invited to browse and apply for posted jobs

The Virtual Career Fair will be online from the Career Events link on the Aeroindustryjobs website from September 1st - 12th, 2008. Exhibitors are encouraged to post their jobs during the pre-registration week starting August 25 2008, to ensure that all of their jobs are posted before the event launches. This event is free of charge for all participants.

Visit [www.aeroindustryjobs.com](http://www.aeroindustryjobs.com),  
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[careerfair@aeroindustryjobs.com](mailto:careerfair@aeroindustryjobs.com)

# Program Tracks

## Nanotechnology

Monday, 2-5 PM, September 8

**Nanocomposites Technology-Tutorial** (requires additional fee)  
Instructor: Drs. Jiang Zhu & Kyle Kissell, Nanoridge Materials Inc.

Tuesday, September 9

9:15 AM Room: Sultana-Mississippi

**Nanocomposites: Processing IA\***

Session Chair: Holly Stretz, Tennessee Technological Univ., Cookeville, TN

11:00 AM Room: Sultana-Mississippi

**Nanocomposites: Processing IB**

Session Chair: Holly Stretz, Tennessee Technological Univ., Cookeville, TN

2:00 PM Room: Sultana-Mississippi

**Nanocomposites: Processing 2A**

Session Chair: Derrick Dean, University of Alabama, Birmingham, AL

3:45 PM Room: Sultana-Mississippi

**Nanocomposites: Processing 2B**

Session Chair: Derrick Dean, University of Alabama, Birmingham, AL

Wednesday, September 10

9:15 AM Room: Sultana-Mississippi

**Nanocomposites: Applications 1A**

Session Chair: Derrick Dean, University of Alabama, Birmingham, AL

11:00 AM Room: Sultana-Mississippi

**Nanocomposites: Applications 1B**

Session Chair: Derrick Dean, University of Alabama, Birmingham, AL

3:45 PM Room: Sultana-Mississippi

**Nanocomposites: CNT/CNF Alignment 1B**

Session Chair: Chuck Bakis, The Pennsylvania State Univ., University Park, PA

Thursday, September 11

9:15 AM Room: Sultana-Mississippi

**Nanocomposites: Electrical & Thermal 1A**

Session Chair: Greg Yandek, Air Force Research Lab, Edwards AFB, CA; Patrick Lake, Applied Sciences, Inc., Cedarville, OH

9:15 AM Room: L12

**Nanocomposites: Analysis and Characterization 1A**

Session Chair: Chuck Bakis, The Pennsylvania State Univ., University Park, PA

11:00 AM Room: Sultana-Mississippi

**Nanocomposites: Electrical & Thermal 1B**

Session Chair: Greg Yandek, Air Force Research Lab, Edwards AFB, CA; Patrick Lake, Applied Sciences, Inc., Cedarville, OH

11:00 AM Room: L12

**Nanocomposites: Analysis and Characterization 1B**

Session Chair: Chuck Bakis, The Pennsylvania State Univ., University Park, PA

1:15 PM - 2:00 PM Room: L10

**Featured Lecture: Polymer Nanocomposites Research in Canada**

Presenter: Suong V. Hoa, Concordia University, Montreal, Quebec, Canada  
Moderators: Ron Gibson, University Nevada-Reno, Reno, NV and Nick Giaris, General Dynamics Land Systems, West Bloomfield, MI

2:00 PM Room: Sultana-Mississippi

**Nano-Industrial Applications 1A**

Session Chair: Patrick Lake, Applied Sciences, Inc., Cedarville, OH

3:45 PM Room: Sultana-Mississippi

**Nanocomposites: Fire Behavior 1B**

Session Chair: Antonio Avila, Universidade Federal de Minas Gerais, Horizonte, MG, Brazil

## Multifunctional Materials

Tuesday, September 9

9:15 AM Room: L12

**Design for Multifunctionality: Capability vs. Application 1A**

Session Chair: Gail Jefferson, University of South Alabama, Mobile, AL

9:15 AM - 12:00 PM Room: L14

**Defense Applications of Multifunctional Materials-Panel**

Panel Moderators: Dr. Richard Vaia, Air Force Research Lab and Dr. B.L. ("Les") Lee Air Force Office of Scientific Research

11:00 AM Room: L12

**Design for Multifunctionality: Capability vs. Application 1B**

Session Chair: Gail Jefferson, University of South Alabama, Mobile, AL

2:00 PM Room: L12

**Nanostructured Multifunctional Materials 1A**

Session Chair: Lawrence Drzal, Michigan State University, East Lansing, MI

2:00 PM Room: L14

**Design for Multifunctionality: Capability vs. Application 2A**

Session Chair: Seun Kahng, NASA Langley Research Center, Hampton, VA

3:45 PM Room: L12

**Nanostructured Multifunctional Materials 1B**

Session Chair: Lawrence Drzal, Michigan State University, East Lansing, MI

Wednesday, September 10

9:15 AM Room: L12

**Electromagnetic Multifunctional Materials 1A**

Session Chair: Sarah Frankland, National Institute of Aerospace, Hampton, VA

9:15 AM - 10:30 AM Room: L14

**Industrial Applications of Multifunctional Materials-Panel**

Panel Moderator: Guru R. Kathawate, G.R. Kathawate & Associates, Inc.

11:00 AM Room: L12

**Electromagnetic Multifunctional Materials 1B**

Session Chair: Sarah Frankland, National Institute of Aerospace, Hampton, VA

11:00 AM - 12:15 PM Room: L14

**Future Directions of Multifunctional Materials Research-Panel**

Panel Moderator: Alan Kin-tak Lau, The Hong Kong Polytechnic University

1:15 PM - 2:00 PM Room: L10

**Featured Lecture: Research on Multifunctional Materials & Structural Health Monitoring in Japan**

Presenter: Dr. Nobuo Takeda, The University of Tokyo, Chiba, Japan  
Moderators: Ron Gibson, University Nevada-Reno, Reno, NV and Nick Giaris, General Dynamics Land Systems, West Bloomfield, MI

2:00 PM Room: L12

**Thermo-Mechanical Multifunctional Materials 1A**

Session Chair: Greg Odegard, Michigan Technological Univ., Houghton, MI

3:45 PM Room: L12

**Thermo-Mechanical Multifunctional Materials 1B**

Session Chair: Greg Odegard, Michigan Technological Univ., Houghton, MI

Thursday, September 11

8:15 AM - 9:00 AM Room: L10

**Featured Lecture: Ionic Polymer-Metal Composite as a New Actuator and Transducer Material**

Presenter: Kwang Kim, University of Nevada, Reno, NV  
Moderators: Ron Gibson, University Nevada-Reno, Reno, NV and Nick Giaris, General Dynamics Land Systems, West Bloomfield, MI

9:15 AM - 5:00 PM Room: L3

**DoD Workshop**

Organizers: B.L. ("Les") Lee, Air Force Office of Scientific Research; James Thomas, Naval Research Lab; and Bruce LaMattina, Army Research Office

2:00 PM Room: L12

**Multifunctional Materials with Integral NDE 1A**

Session Chair: Soma Perooly, Proto Manufacturing Inc., Ypsilanti, MI

\*Session contains ITAR restricted papers.

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Cost for Tutorials: Tutorials are half-day courses that require a separate cost from the cost of registration at the conference. A printed course handout is included in the price.

Prices are: \$150 with conference registration • \$100 for students • \$175 for other registrants

**Monday, 9 AM - Noon, September 8, 2008**

**Design of Composite Aircraft Structures**

*Instructor: Prof. Doug Cairns, Montana State University*

**Composites Fabrication Technologies**

*Instructor: Dr. James C. Leslie, ACPT Inc.*

**Introduction to Composite Materials**

*Instructor: Dr. Carl H. Zweben, Composites Consultant*

**Mechanical Testing of Composite Materials**

*Instructor: Prof. Daniel O. Adams, University of Utah*

**Monday, 2 - 5 PM, September 8, 2008**

**Nanocomposites Technology**

*Instructor: Drs. Jiang Zhu and Kyle Kissell, Nanoridge Materials Inc.*

**Thermoplastic Composites Technologies**

*Instructor: Dr. Conchur O’Bradaigh, Eire Composites*

**Processing Science for Composite Structures Manufacturing**

*Instructor: Profs. Anoush Poursartip, Goran Fernlund, University of British Columbia*

**Damage Tolerance of Composites: Analysis and Testing**

*Instructor: Dr. Keshavanarayana Raju, Wichita State University*

**Important session information for all attendees.**

**SAMPE Restricted Papers —ITAR Regulations Session Admittance**



**(REVISED PROCEDURES 6/05)**

Several papers to be presented at this conference will be restricted papers governed by ITAR (International Traffic in Arms Regulations). The U.S. citizens SAMPE list used at previous conferences will not be available. If you plan to attend any presentations restricted by ITAR, you must bring proof of citizenship plus the other verification documents as shown below. Please note that only U.S. citizens and U.S. Resident Aliens can be considered for attendance at these restricted presentations.

Admittance to restricted sessions and access to restricted technical papers is implemented and controlled by U.S. International Traffic in Arms Regulations (ITAR). All restricted session attendees **MUST** abide by the procedures and submittal of verification documents as noted below – no exceptions:

<b>ATTENDEE CLASSIFICATION</b>	<b>IDENTIFICATION &amp; PROOF OF EMPLOYMENT REQUIREMENTS</b>
U.S. Government Employees	<ol style="list-style-type: none"> <li><b>1.</b> Proof of Citizenship (for example, passport, birth certificate, voters registration card, naturalization papers), <b>and</b>,</li> <li><b>2.</b> Personal photographic identification (passport, driver’s license, corporate ID, etc.)</li> </ol>
U.S. Citizens	<ol style="list-style-type: none"> <li><b>1.</b> Proof of Citizenship (for example, passport, birth certificate, voters registration card, naturalization papers), <b>and</b>,</li> <li><b>2.</b> Personal photographic identification (passport, driver’s license, corporate ID, etc.), <b>and</b>,</li> <li><b>3.</b> Certification credentials based on DD Form 2345 (see below for details)</li> </ol>
Resident Aliens (U.S.)	<ol style="list-style-type: none"> <li><b>1.</b> Resident Alien Card, <b>and</b>,</li> <li><b>2.</b> Personal photographic identification (passport, driver’s license, corporate ID, etc.), <b>and</b>,</li> <li><b>3.</b> Certification credentials based on DD Form 2345 (see below for details)</li> </ol>

DD Form 2345 individual certification credentials (required for U.S. & Resident Aliens) must be from one of the following:

1. Copy of an approved and active DD Form 2345 for the individual, or,
2. Copy of an approved and active DD Form 2345 for the individual’s employer PLUS evidence of current employment status with that employer (corporate ID, business card, etc.), or,
3. A listing of the individual’s employer in the most recent DoD quarterly Qualified U.S. Contractor Access List PLUS evidence of current employment status with that employer (corporate ID, business card, etc.).

DD Form 2345 may be downloaded and completed online in order to apply for approval to be listed on the Qualified U.S. Contractor List, [www.dlis.dla.mil/jcp/](http://www.dlis.dla.mil/jcp/). Allow at least 4 weeks prior to the SAMPE symposia or technical conference dates for this process.

**How to get your ITAR Clearance:**

Bring all of the above listed identification, proof of employment and certification credentials to the to the SAMPE Clearance counter at the SAMPE Registration area. Your documents will be verified and you will be provided with a stamp indicating your ITAR clearance. Photo ID will be checked against your ITAR badge before admittance is granted to any ITAR presentation.

8:00 AM - 9:00 AM Ballroom C&D  
 SAMPE Keynote Presentation

**"Multifunctional Materials for Adaptive & Autonomic Systems: An Overview"**

By: Dr. B.L. ("Les") Lee, Air Force Office of Scientific Research, Arlington, VA

The efforts to develop a newer generation of structures with more advanced performance and higher system efficiency have been guided by two criteria: (a) the achievement of maximum load-carrying capability per unit weight or volume and (b) the incorporation of specific functional properties dictated by the system requirements with minimum weight penalty. Traditionally, these two issues are addressed separately, resulting in a passive structure of optimum load-carrying capability with compartmentalized functionality often in the form of attached components. However, this approach is in stark contrast to biological systems, in which jointed frameworks and complex materials impart active functionality at multiple length scales within the materials. Our new challenge has been to learn from and mimic nature's design by developing "multifunctional" load-bearing structures with integrated functional properties, such as remediation of cracks, thermal management, vibration mitigation, detection of external threats, protection against electromagnetic radiation, built-in communication channel, self-supply of power, etc. The realization of analogous synthetic structures, which can accommodate the above-cited functions, depends on the combination of new "multifunctional" materials that inherently possess the capacity to meet the requirements for specific functionality as well as mechanical load carrying capability. It is hoped that individual material elements are simultaneously participating in distinct, beneficial physical processes thereby delivering truly dramatic improvements in system-level efficiency instead of incremental improvements encountered in mono-functional materials.

Room: Sultana-Mississippi

**Nanocomposites: Processing 1A-1B**

Session Chair: Holly Stretz, Tennessee Technological University, Cookeville, TN

9:15 AM

**Reinforced Films Made by Crosslink Reaction Between Water-Soluble Sulfonated Carbon Nanotubes and Sulfonated Polystyrene**, Y. Dai, H. Haiping, South Dakota School of Mines and Technology, Rapid City, SD; J.S. Welsh, Air Force Research Laboratory, Kirtland AFB, NM

9:40 AM

**Cure Behavior of Epoxy/MWCNT Nanocomposites: The Effect of Nanotube Surface Modification**, M. Abdalla, D. Dean, University of Alabama at Birmingham, Birmingham, AL; P. Robinson, Tuskegee University, Tuskegee, AL; E. Nyairo, Alabama State University, Montgomery, AL

11:00 AM

**Polyimide Nanocomposite Membranes for Separation of Water and Ethanol**, J.O. Iroh, W. Zhang, A. Anim-Mensah, J-P. Lee, University of Cincinnati, Cincinnati, OH

11:25 AM

**The Effects of Single-Wall Carbon Nanotubes on the Shear Piezoelectricity of Biopolymers**, C. Lovell, J.M. Fitz-Gerald, Department of Materials Science and Engineering, University of Virginia, Charlottesville, VA; J.S. Harrison, Advanced Materials and Processing Branch, NASA Langley Research Center, Hampton, VA; C. Park, National Institute of Aerospace, Hampton, VA



Room: L12

**Design for Multifunctionality: Capability vs. Application 1A-1B**

Session Chair: Gail Jefferson, University of South Alabama, Mobile, AL

9:15 AM

**Crosslinked Templated Mesoporous Silica Aerogels as Multifunctional Materials**, H. Lu, H. Luo, G. Churu, Oklahoma State University, OK; S. Mulik, C. Sotiriou-Leventis and N. Leventis, Missouri University of Science and Technology, MO

9:40 AM

**Carbon Nanotube Networks: In Situ Sensing of Damage Evolution in Fiber Composites**, E.T. Thostenson, T.-W. Chou, University of Delaware, Newark, DE; L. Gao, Beijing University of Aeronautics and Astronautics, Beijing, China

10:05 AM

**Strain and Temperature Sensing Properties of Multiwalled Carbon Nanotube Yarn Composites**, S.K. Kahng, T.S. Gates, NASA Langley Research Center, Hampton, VA; G.D. Jefferson, National Institute of Aerospace, Hampton, VA

11:00 AM

**Analyzing Interlaminar Shear Strength of Multi-Scale Composites via Combined Finite Element and Progressive Failure Analysis Approach**, M. Garg, F. Abdi, Alpha Star Corporation, Long Beach, CA; S. McHugh, Lockheed Martin Corporation, Palo Alto, CA

11:25 AM

**Tailoring Thermal Properties in Composite Materials and Its Interfaces for Thermo-Mechanical Applications**, A.K. Roy, Air Force Research Laboratory, AFRL/RXBT, Wright-Patterson AFB, OH; S. Sihn, S. Ganguli, University of Dayton Research Institute, Dayton, OH; V. Varshney, Universal Technology Corporation, Dayton, OH

**Vendor Breaks**

Tuesday & Wednesday  
 10:30 AM - 11:00 AM  
 3:15 PM - 3:45 PM

Complimentary coffee will be available in the exhibition hall, sponsored by ASC.




Room: L5

**Aerospace Structures and Applications 1A-1B**

Session Chair: George Khawand, General Dynamics ATP, Burlington, VT

9:15 AM

**Proton Exposure Tolerance of Rohacell 31 HF Foam,**  P. Hogue, B. Brawley, Johns Hopkins University Applied Physics Laboratory, Laurel, MD; D. Hubert, Point Magu, CA; A. Daugherty, B. Marinelli, Naval Air Weapons Center, China Lake, CA; D. Price, Raytheon Space and Airborne Systems, El Segundo, CA

9:40 AM

**Safe-Life Coupon Testing of Aluminum Lined Pressure Vessels with Strain Ranges Exceeding Elastic Limits,**  M.B. Elliott, A.S. Hieronymus, General Dynamics Armament and Technical Products, Lincoln, NE

10:05 AM

**Design and Manufacturing of Quasi-Three-Dimensional Woven Composites,** D. Liu, K. Rosario, Michigan State University, East Lansing, MI; B.B. Raju, U.S. Army RDECOM/TARDEC, Warren, MI

11:00 AM

**Residual Stress Modeling in the Milling Process Considering the Tribological Behavior of the Material Pair for Dry Conditions,** B.M. Abraham, S.Y. Liang, J. Morehouse, Georgia Institute of Technology, Atlanta, GA

11:25 AM

**Design, Characterization, Control, and Optimization of A 'Super String' Deployable Structure,** M. Buckler, M. Zupan, University of Maryland Baltimore County, Baltimore, MD; M.A. Brown, TTH Research, Laurel, MD

11:50 AM

**Epoxy Paint Failure in B-52 Fuel Tanks – Preliminary Development of a Model for the Process,** R. Gandikota, A. Aliband, D.W. Lenz, L.E. Stevenson, T. Whitmer, R. Cash, W.T. Stevenson, Wichita State University, Wichita, KS

Room: L10

**Infrastructure Applications 1A-1B**

Session Chair: Hwai-Chung Wu, Wayne State University, Detroit, MI

9:15 AM

**Status of Using Fiber-Reinforced Polymer Composites in U.S. Bridges,** L.N. Triandafilou, P.E., Federal Highway Administration, Resource Center Structures Technical Service Team, Baltimore, MD

10:05 AM

**Comparison of Composite Slab Deflections Under Blast Loads Using A Proposed Simple Practical Analytical Model and A Procedure Involving RISA-3D,** M.A. Faruqi, J. Sai, P. Shah, Texas A & M University-Kingsville, Kingsville, TX; H. Estrada, The University of Pacific, Stockton, CA

11:00 AM

**Damage Sensing of Bond Interface Between FRP Reinforcement and Steel Girders,** S. Yamada, Y. Yoshida, S. Saito, Toyohashi University of Technology, Toyohashi, Japan; S. Yamada, Topy Industries, Ltd, Toyohashi, Japan; I. Komiya, Fukui Fibertech Co, Toyohashi, Japan

11:25 AM

**Development of Fiber Reinforced Cementitious Composites,** H.-C. Wu, Wayne State University, Detroit, MI

Room: L5

**Manufacturing & Processing Advances 1A-1B**

Session Chair: Singho Yoon, Iowa State University, Ames, IA

9:15 AM

**Foldable GFRP Boat Using Partially Flexible Composites,** A. Todoroki, K. Kumagai, R. Matsuzaki, Tokyo Institute of Technology, Tokyo, Japan

9:40 AM

**Thermal and Thermal Stress Analyses of the State-change Tooling,** A. Vuppala, S.-Y. Luo, University of Nevada, Reno, NV; G. Calvert, J. Cao, L. Clements, 2Phase Technologies, Inc., Santa Clara, CA

10:05 AM

**Block Copolymers for Epoxy Toughening,** R. Barsotti, S. Schmidt, N. Macy, M. Wells, Arkema, King of Prussia, PA; R. Inoubli, St. Magnet, Arkema, Lacq, France; C. Navarro, Arkema, Cerdato, France

11:00 AM

**Effect of Low Profile Additive (LPA) on the Physical and Mechanical Properties of Polyester,** M.K. Saraswat, K.M.B. Jansen, L.J. Ernst, Delft University of Technology, Delft, The Netherlands; R. Grimbergen, DSM Composites Resin, Zwolle, The Netherlands; F. Lauterwasser, DSM Composites Resin Deutschland GmbH, Ludwigshafen, Germany

11:25 AM

**Impact Characterization of Core-Filled Pultruded Biocomposite Panels,** R.R. Vuppalapati, K. Chandrashekhara, W.E. Showalter, Missouri University of Science and Technology, Rolla, MO

11:50 AM

**A Design of Experiments (DoE) Approach to Material Properties Optimization of Electrospun Nanofibres,** S.R. Coles, D. K. Jacobs, K. Kirwan, University of Warwick, Coventry, UK; J. Stanger, N. Tucker, Crop and Food Research Institute, Christchurch, New Zealand

Room: L14

**Defense Applications of Multifunctional Materials - Panel**

9:15 AM - 12:00 PM

Panel Moderators: Dr. Richard Vaia, Air Force Research Lab and Dr. B.L. ("Les") Lee Air Force Office of Scientific Research

Two major drivers governing the development of new Defense systems for the future Armed Forces have been the achievement of maximum load-carrying capability per unit weight/volume and the incorporation of a variety of functional properties dictated by the system requirements. Traditionally, these two issues are addressed separately, resulting in incremental improvements in mono-functional materials. However, dramatic improvements in system-level efficiency can be achieved by developing "multifunctional" materials that inherently possess the capacity to simultaneously meet the above two requirements. This panel discussion is intended to provide an overview of how the above described goals can be achieved and to assess the present needs, future possibilities and potential barriers.

Panelists:

- Mr. Bill Baron (Air Force Research Lab, Air Vehicles Directorate)
- Dr. Danny O'Brien (Army Research Lab)
- Dr. Edward Silverman (Northrop-Grumman)
- Dr. Jim Thomas (Naval Research Lab)
- Dr. Richard Vaia (Air Force Research Lab, Materials Directorate)

**Vendor Breaks**

Tuesday & Wednesday  
10:30 AM - 11:00 AM  
3:15 PM - 3:45 PM

Complimentary coffee will be available in the exhibition hall, sponsored by ASC.



Room: Sultana-Mississippi

**Nanocomposites: Processing 2A-2B**

Session Chair: Derrick Dean, University of Alabama, Birmingham, AL

2:00 PM

**High-Temperature Cyanate Ester Adhesives Reinforced with Alumina Nanoparticles**, M.R. Kessler, W. Lio, X. Sheng, M. Akinc, Iowa State University, Ames, IA

2:25 PM

**Effect of Surface Morphology Modifications on Mechanical Properties of Fiber Reinforcements**, M.S. Buckler, H.C. Malecki, M. Zupan, University of Maryland Baltimore County, Baltimore, MD

2:50 PM

**A Two-Tier Approach for Addition of MWNT to Manufacture Fiber-Reinforced Polymer Nanocomposites**, A. Rodriguez, C. Lim, M. Guzman, P. Kashani, B. Minaie, Wichita State University, Wichita, KS

3:45 PM

**Fabrication of Ferrofluids at Controlled PH Values for Biomedical Applications**, R. Asmatulu, B. Cooper, H. Misak, Wichita State University, Wichita, KS

4:10 PM

**Solvent Evaporation and Agitation Time Effects on Mechanical Properties of Polymeric Nanocomposites**, K.A. Shenoy, R. Asmatulu, B. Bahr, Wichita State University, Wichita, KS

Room: L12

**Nanostructured Multifunctional Materials 1A-1B**

Session Chair: Lawrence Drzal, Michigan State University, East Lansing, MI

2:00 PM

**Enhancing the Through-Thickness Thermal Conductivity of Carbon Fiber Polymer-Matrix Composites by Nanostructuring the Interlaminar Interface**, S. Han, J.T. Lin, Y. Yamada, D.D.L. Chung, University at Buffalo, State University of New York, Buffalo, NY

2:25 PM

**Multiscale Fiber Reinforced Composites Using A Carbon Nanofiber/Epoxy Nanophased Matrix: Processing, Properties, and Thermomechanical Behavior**, K.J. Green, D. Dean, U. Vaidya, University of Alabama at Birmingham, Birmingham, AL

2:50 PM

**Dispersion Optimization of Exfoliated Graphite Nanoplatelets in Polypropylene: Extrusion vs Precoating of PP Powder**, H.-M. Park, K. Kalaitzidou, H. Fukushima, L.T. Drzal, Michigan State University, East Lansing, MI

3:45 PM

**The Effect of Exfoliated Graphite Nanoplatelet Size on the Mechanical and Electrical Properties of Vinyl Ester Nanocomposites**, W. Liu, Inhwan Do, H. Fukushima, L.T. Drzal, Michigan State University, East Lansing, MI

4:10 PM

**Nanostructured Coupling Agents for Multifunctional Composites**, K. Green, M. Abdalla, N. Horton, A. Noble, D. Dean, Univ. of Alabama at Birmingham, Dept. of Materials Science & Engineering, Birmingham, AL; M.T. Universal Technology Corp., Dayton OH; J. Fielding, Air Force Research Lab., WPAFB, OH; S. Miller, Polymeric Materials Branch, Structures & Materials Division, NASA John H. Glenn Research Center, Cleveland, OH

4:35 PM

**Multifunctional Polymer-Matrix and Cement-Matrix Structural Materials**, D.D.L. Chung, Univ. at Buffalo, State Univ. of New York, Buffalo, NY

Room: L14

**Design for Multifunctionality: Capability vs. Application 2A**

Session Chair: Seun Kahng, NASA Langley Research Center, Hampton, VA

2:00 PM 1<sup>st</sup> Place Outstanding Paper

**Fabrication and Electromechanical Characterization of A Piezoelectric Structural Fiber for Multifunctional Composites**, Y. Lin, H.A. Sodano, Arizona State University, Tempe, AZ

2:25 PM

**Mechanical and Interface Properties of Carbon Nanofibers for Polymer Nanocomposites**, T. Ozkan, Q. Chen, M. Naraghi, I. Chasiotis, University of Illinois at Urbana-Champaign, Urbana, IL

2:50 PM

**Deformation and Fracture of Epoxy Nanocomposites with Silica Inclusions**, Q. Chen, I. Chasiotis, Univ. of Illinois at Urbana-Champaign, Urbana, IL; C. Chen, Univ. of Dayton Research Institute, Dayton, OH; A. Roy, Air Force Research Lab., Wright-Patterson AFB, Dayton, OH

Room: L10

**Infrastructure Applications 2A**

Session Chair: Hwai-Chung Wu, Wayne State University, Detroit, MI

2:00 PM

**Dynamic Mechanical Thermal Analyses of Polymeric Concrete Repair Materials**, T.S. Rushing, US Army Engineer Research and Development Center Geotechnical and Structures Laboratory, Vicksburg, MS

2:25 PM

**Lifecycle Predictions of Filament-Wound Polyurethane Utility Poles**, M. Brown, M. Berksoy, RS Technologies, a Division of Resin Systems, Inc., Calgary, Alberta, Canada

Room: L5

**Manufacturing & Processing Advances 2A-2B**

Session Chair: Dale Brosius, Quickstep Technologies, Brighton, MI

2:00 PM

**Non-Autoclave Prepreg Manufacturing Technology**, G.G. Bond, J.M. Griffith, G.L. Hahn, The Boeing Company, Berkeley, MO

2:25 PM

**The Creation of Ductile, Composite Prepregs, with Close to UD Properties**, R. Ford, B. Griffiths, Integrated Materials Technology Ltd (IMT), Bury St. Edmunds, Suffolk, UK

2:50 PM

**Tool-Shape Optimization to Minimize Warpage in Autoclave Processed L-Shaped Composite Part**, A.-R. Khorsand, J. Raghavan, G. Wang, University of Manitoba, Winnipeg, Canada



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Manufacturing & Processing Advances 2A-2B (Continued)

3:45 PM

Development of Time-Temperature-Transformation Diagram during Cure of Polymer Composites Using Shear Rheometry and Thermal Analysis, P. Kashani, S. Alavi-Soltani, F. Ghods, B. Minaie, Wichita State University, Wichita, KS

4:10 PM

Development of a Ultra-High-Pressure RESS System for Synthesizing Nano-Sized Energetic Materials, A.C. Cortopassi, K.K. Kuo, P.J. Ferrara, T.M. Wawiernia, J.T. Essel, The Pennsylvania State University, University Park, PA

4:35 PM

Effects of High-Pressure RESS Operating Conditions on the Size of Synthesized Nano-Scale RDX Particles, T.M. Wawiernia, K.K. Kuo, P.J. Ferrara, A.C. Cortopassi, J.T. Essel, The Pennsylvania State University, University Park, PA

Room: L3

Composite Design & Analysis 1A-1B

Session Chair: Ed Semmes, NASA Marshall Space Flight Center, MSFC, AL

2:00 PM

Finite Element Analysis of Off-Axis Unidirectional Laminates with Intralaminar Damage, Y. Zhang, Institute for Aerospace Research, National Research Council Canada, Ottawa, ON, Canada

2:25 PM

A Computational Approach for Predicting A- and B-Basis Allowables for Polymer Composites, G. Abumeri, M. Garg, Alpha Star Corporation, Long Beach, CA; M. Reza Talagani, Delft University of Technology, Delft, The Netherlands

2:50 PM

Multi-Layer 2D Numerical Model for Z-Pin Composite Laminates: Compression Response and Failure, H. Huang, A.M. Waas, University of Michigan, Ann Arbor, MI

3:45 PM

Investigation of Composite Surface Effect Ship (SES) Hull Structure Under Hydrodynamic Loading Using Fluid-Structure Interaction, S. Ma, H. Mahfuz, Nanocomposites Laboratory, Ocean Engineering Department, Florida Atlantic University, Boca Raton, FL

4:10 PM

Investigation of Infusion of Ultra High Molecular Weight Polyethylene (UHMWPE) and Carbon Nanotube (CNT) into Low Density Polyethylene (LDPE) Filaments, M. Khan, H. Mahfuz, T. Leventouri, Florida Atlantic University, Boca Raton, FL

4:35 PM

Life Prediction of Carbon Fiber/PEKK Thermoplastic Composite Material for Structures Design, E. Dan-Jumbo, R. Keller, B. Westerman, The Boeing Co., Seattle, WA; A. Kuraishi, S.W. Tsai, J. Wang, Stanford University, CA

Vendor Breaks

Tuesday & Wednesday
10:30 AM - 11:00 AM
3:15 PM - 3:45 PM

Complimentary coffee will be available in the exhibition hall, sponsored by ASC.



Room: L10

Environmental Considerations 1B

Session Chair: Germán Reyes, University of Michigan-Dearborn, Dearborn, MI

3:45 PM

Stochastic Modeling of Damage Evolution and Stiffness Degradation in Composites Under Environmental Ageing, R. Rahman, A. Haque, University of Alabama, Tuscaloosa, AL

4:10 PM

Particle and Fiber Exposures During Processing of Hybrid Carbon-Nanotube Advanced Composites, B.L. Wardle, N. Yamamoto, R. Guzman deVilloria, E.J. Garcia, A. John Hart, M. Hallock, Massachusetts Institute of Technology, Cambridge, MA; D. Bello, K. Ahn, University of Massachusetts, Lowell, Lowell, MA

Room: L14

Reinventing Reality: The Quest for Multifunctional Material Properties- Panel

3:45 PM - 5:00 PM

Panel Moderator: Steve Rodgers, ITT Integrated Structures, Salt Lake City, UT

The foundational enabler for any technology is discovering, developing or creating the right material to support that technology. Most often, engineering has been the fine art of compromise; the material properties may not always be perfect for the application, but they can be effectively optimized through appropriate design trades. Now, however, there is a new class of materials designed for optimization, materials in which the properties are designed for multiple, and sometimes mutually exclusive, functions.

This panel will give you an opportunity to hear from the leaders of SAMPE's Technical Communities about how they pursue the creation of Multifunctional Materials. Presentations on the development of resins, the effective use of nanotechnology, the onset of new predictive computer modeling techniques and the impact of multifunctional development on the realm of morphing materials will be followed by 30-minute question and answer period.

Panelists:

- LaNetra Clayton Tate, Ph.D, Applied Technology Directorate, NASA
Joseph H. Koo, Sc. D., The University of Texas at Austin
David Rigby, Accelrys Software Inc.
Jeff Baur, Air Force Research Lab

Welcome Reception-Ballroom E

5:00 PM - 6:00 PM

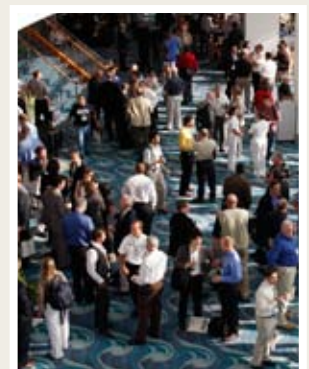
On the Exhibits & Ballroom Level Join us for the Welcoming Reception, an excellent place to network with new and existing colleagues and business partners.

Joint SAMPE/ASC Tribute to Tom Gates

8:00 PM

Memphis Room at the Marriott Hotel

This special joint ASC/SAMPE session will give the friends and colleagues of Tom Gates an opportunity to share their special memories of Tom, who passed away on April 18, 2008.



Room: Sultana-Mississippi

**Nanocomposites: Applications 1A-1B**

Session Chair: Derrick Dean, University of Alabama, Birmingham, AL

9:15 AM

**Processing and Performance of Nanoclay Infused Low Density Polyurethane Foams**, D.C. Robinson, M.V. Hosur, S. Jeelani, Tuskegee University, Tuskegee, AL

9:40 AM 3<sup>rd</sup> Place Outstanding Paper

**Stab Characterization of Ballistic Fabrics Impregnated with Shear Thickening Fluid**, H.M. Rao, J. Mayo, Jr., M.V. Hosur, S. Jeelani, Tuskegee University, Tuskegee, AL

10:05 AM

**Nanocomposite Mold Design and Manufacturing; Part II: Mold Manufacturing and Testing**, K. Han, B. Rice, D. Johnson, J. Hartings, T. Glenchur, J. Hickey, Univ. of Dayton Research Institute, Dayton, OH

11:00 AM

**Synthesis and Characterization of Nanocomposite Coatings for the Protection of Metal Surfaces**, R. Asmatulu, S. Revuri, Wichita State University, Wichita, KS

11:25 AM

**Effect of Surface Modification on the Rheology of Montmorillonite Clay/Polyimide Nanocomposites**, J.O. Iroh, Univ. of Cincinnati, Cincinnati, OH; E. Garcia, General Electric Aircraft Engines, Cincinnati, OH

11:50 AM

**Potting Compound Strength Enhancement Using Carbon Nanomaterials**, J. Baalman, M. Guzman, A. Rodriguez, B. Minaie, Wichita State University, Wichita, KS

Room: L12

**Electromagnetic Multifunctional Materials 1A-1B**

Session Chair: Sarah Frankland, National Institute of Aerospace, Hampton, VA

9:15 AM

**Measurements of Shielding Effectiveness in Polymer Coating and Composite Systems**, A. Small, M. Hirsch, T. Plaisted, Luna Innovations Incorporated, Blacksburg, VA

9:40 AM

**Multifunctional Integration and Characterization of Thin Film Silicon Solar Cells on Carbon Fiber Reinforced Epoxy Composites**, K.J. Maung, H.T. Hahn, Y.S. Ju, Univ. of California, Los Angeles, CA

10:05 AM

**Mechanical and Electromagnetic Characterization of Pultruded Polymeric Composite Materials**, E. Lackey, J.G. Vaughan, R. Averill, L. Bennett, W. Elliott Hutchcraft, R.K. Gordon, Univ. of Mississippi, University, MS

11:00 AM

**Three Phase Composites for Multifunctional Structural Capacitors**, F. Chao, N. Bowler, X. Tan, M.R. Kessler, Iowa State University, Ames, IA; G Liang, Northwestern Polytechnical University, Xi'an, China

11:25 AM

**Structure-Battery Composites for Marine Applications – Part I: Multifunctional Design and Fabrication**, W.R. Pogue III, J.P. Thomas, Multifunctional Materials Branch, Naval Research Laboratory, Washington, D.C.; M.A. Siddiq Qidwai, A. Rohatgi, Science Applications International Corporation, c/o Naval Research Lab., Washington, D.C.

11:50 AM

**Structure-Battery Composites for Marine Applications – Part II: Multifunctional Performance Characterization**, A. Rohatgi, M.A. Siddiq Qidwai, Science Applications International Corporation, c/o Naval Research Laboratory, Washington, D.C.; W.R. Pogue III, J.P. Thomas, Multifunctional Materials Branch, Naval Research Lab., Washington, D.C.

Room: L3

**Composite Fatigue & Fracture 1A-1B**

Session Chair: Kevin Koudela, Pennsylvania State University, State College, PA

9:15 AM

**Fatigue Modeling of Marine Composites**, E.C. Strauch, K.L. Koude-la, Applied Research Lab., The Pennsylvania State Univ., State College, PA

9:40 AM

**Influence of Time-Dependent Damage on Creep of Multidirectional Polymer Composite Laminates**, A. Asadi, J. Raghavan, Composite Materials & Structures Research Group, Univ. of Manitoba, Winnipeg, Canada

10:05 AM

**A Computational Investigation of Impact into Multi-Plies of Plain-Woven Fabric**, M. Grujicic, W. C. Bell, T. He, G. Arakere, Clemson University, Clemson, SC; B.A. Cheeseman, Army Research Lab.-Survivability Materials Branch, Aberdeen Proving Ground, MD; K.L. Koudela, J.F. Tarter, Applied Research Lab., The Pennsylvania State Univ., State College, PA

11:00 AM

**The Bearing Strength of Titanium-Graphite Fiber Metal Laminates**, J.M. Hundley, H.T. Hahn, J.-M. Yang, Univ. of California Los Angeles, Los Angeles, CA; A.B. Facciano, Raytheon Missile Systems, Tucson, AZ

11:25 AM 2<sup>nd</sup> Place Outstanding Paper

**Strain Mapping for Performance and Failure Prediction in Composites Using Digital Image Correlation**, G.P. Dillon, J.F. Tarter, C. Byrne, C.L. Rachau, C.L. Muhlstein, J.G. Collins, The Pennsylvania State University, University Park, PA

11:50 AM

**Mode I Failure in Z-Pinned Co-Cured Laminated Composites**, S.R. Soni, J. Freels, J. Kuhn, Air Force Institute of Technology, Wright-Patterson AFB, OH

**2008 SAMPE Fall Technical Conference  
Outstanding Paper Winners**

**1<sup>st</sup> Place Outstanding Paper**

*Fabrication and Electromechanical Characterization of a Piezoelectric Structural Fiber for Multifunctional Composites*, Yirong Lin and Henry A. Sodano, Arizona State University, Tempe, AZ

**2<sup>nd</sup> Place Outstanding Paper**

*Strain Mapping for Performance and Failure Prediction in Composites Using Digital Image Correlation*, Gregory P. Dillon, James F. Tarter, Christopher Byrne, Christopher L. Rachau, Christopher L. Muhlstein, and James G. Collins, The Pennsylvania State University, University Park, PA

**3<sup>rd</sup> Place Outstanding Paper**

*Initial Design of the Automotive Composites Consortium Structural Composite Underbody*, Hannes P. Fuchs, Multimatic Engineering Services Group, Livonia, MI

**SAMPE Congratulates the Authors of the  
Outstanding Papers!**

Room: L10

## Composites for the Automotive Industry 1A-1B

Session Chair: Libby Berger, General Motors, Warren, MI

9:15 AM

### Interlayer Hybrid Composites of Chopped and Woven Carbon Fiber

M.A. Janney, Materials Innovation Technology LLC, Fletcher, NC

9:40 AM

### Initial Design of the Automotive Composites Consortium Structural Composite Underbody

H.P. Fuchs, Multimatic Engineering Services Group, Livonia, MI

10:05 AM

### Materials and Processes for a Structural Composite Underbody

L. Berger, General Motors Research and Development Center, Warren, MI; E. Banks, Polywheels Manufacturing Ltd., Livonia, MI; R. Wlosinski, USCAR, Southfield, MI

11:00 AM

### Creep Characterization of Seven Automotive Composite Materials

M.C. Cook, J.M. Henshaw, The University of Tulsa, Tulsa, OK; and D.Q. Houston, Ford Motor Company, Detroit, MI

11:25 AM

### Design Considerations for Energy Absorption in Automotive Sandwich Composites

J. Van Otten, S.E. Stapleton, D.O. Adams, University of Utah, Salt Lake City, UT

11:50 AM

### An Integrated Approach Linking Process to Structural Modeling with Microstructural Characterization for Injection-Molded Long-Fiber Thermoplastics

B. Nghiep Nguyen, S.K. Bapanapalli, M.T. Smith, Pacific Northwest National Laboratory, Richland, WA; V. Kunc, B.J. Frame, R.E. Norris Jr., Oak Ridge National Laboratory, Oak Ridge, TN; J.H. Phelps, C.L. Tucker III, University of Illinois at Urbana-Champaign, Department of Mechanical Science and Engineering, Urbana, IL; X. Jin, J. Wang, Moldflow Ithaca, Ithaca, NY

Room: L5

## Composites from Agricultural Products 1A-1B

Session Chair: Michael Kessler, Iowa State University, Ames, IA

9:15 AM

### High Strength Green Composites

A.N. Netravali, Department of Fiber Science & Apparel Design, Cornell University, Ithaca, NY

9:40 AM

### Plant Protein Based Plastics and Applications

D. Grewell, G. Srinivasan, M. Baboi, M.R. Kessler, W. Graves, M. Helgeson, Iowa State University, Ames, IA

10:05 AM

### Bio-Based Materials from Vegetable Oils

A. Campanella, R.P. Wool, University of Delaware, Newark, DE

11:00 AM

### Curing and Properties of Thermoset Canola Oil Based Resins

M. Fahimian, Devi Adhikari, J. Raghavan, University of Manitoba, Winnipeg, Canada; R. P. Wool, University of Delaware, Newark, DE

11:25 AM

### Thermal Analysis of Bio-based Rubber Composites from Plant Oils

S. Yoon, Iowa State University, Ames, IA and Kumoh National Institute of Technology, Gyeongbuk, Korea; W. Jeong, M. Valverde, R. Larock, M.R. Kessler, Iowa State University, Ames, IA

11:50 AM

### Properties of Poly(Lactic Acid)/Polypropylene Blends

J.-F. Zhang, L. Grigorian, J. Zhu, T. Robinson, S. Ray Chaudhuri, YTC America Inc., Camarillo, CA

Room: L14

## Industrial Applications of Multifunctional Materials-Panel

9:15 AM - 10:30 AM

Panel Moderator: Guru R. Kathawate, G.R. Kathawate & Associates, Inc.

Every industry is facing many challenges today due to the increase in oil prices and the global awareness on developing environmentally friendly products. These two events have triggered concerns and worry at every level from politicians and industrialists to the common man. The engineering community is being challenged in a big way. This forces materials engineers and scientists to think of ways and means to look at how multifunctional materials can be used to build high performance and efficient products in a creative way at low cost

Our team of panelists consisting of experts from global industry and academia, discuss their views on how multifunctional materials can be used to develop products to overcome some of these problems.

Panelists:

Jim Kuenz, E-A-R Specialty Composites, Inc.

Abhijit Gupta, Northern Illinois University

Alan K.T. Lau, The Hong Kong Polytechnic University

Russ Maguire, The Boeing Company

Room: L14

## Future Directions of Multifunctional Materials Research-Panel

11:00 AM - 12:15 PM

Panel Moderator: Alan Kin-tak Lau, The Hong Kong Polytechnic University

The development of multifunctional materials has been undergoing a progressive period since the last decade, the fields of research and applications have covered a large variety of ranges which include but not limited to civil infrastructures, aerospace structures and components, domestic product design and development, micro-electro-mechanical systems (MEMS), Nano-electro-mechanical systems (NEMS), bio-medical and bio-engineering applications. In this panel session, the discussion will be focused on the future development of multifunctional materials and structures, and how to get start on creating cross-disciplinary research and collaboration between universities, research centres and the industry, in which the connection between upstream research and then downstream applications has to be effectively linked. The identification of the future trends on materials research and then narrowing down the focus to multifunctional-materials research to support the directions will be discussed.

Panelists:

Dae-Soon Lim, Korea University

Deborah D.L. Chung, University at Buffalo

Jinsong Leng, Harbin Institute of Technology

Russ Maguire, Multifunctional Mat'ls & Structures Enterprise TIG

Room: L10

**Featured Lecture: Research on Multifunctional Materials & Structural Health Monitoring in Japan**

1:15 PM - 2:00 PM

*Presenter: Dr. Nobuo Takeda, The University of Tokyo, Chiba, Japan*

*Moderators: Ron Gibson, University Nevada-Reno, Reno, NV and Nick Gianaris, General Dynamics Land Systems, West Bloomfield, MI*

The author has been leading a series of Japanese industry-university collaboration projects on smart materials/structures and structural health monitoring (SHM) these several years. Some representative research results are presented on multi-functional materials and SHM of composite structures developed in these projects.

Room: L14

**NDE & Structural Health Monitoring 1A-1B**

*Session Chair: Emmanuel Ayorinde, Wayne State University, Detroit, MI*

2:00 PM

**Ultrasonic Nondestructive Evaluation of Composite Materials and Structures**, D.K. Hsu, Iowa State University, Ames, IA

2:25 PM

**Automated Portable Ultrasonic Disbond Inspection System for Ground Vehicle Metal Matrix Composite Track Shoes**, X. Zhao, D. Xiang, F. Yan, Z. Ren, Intelligent Automation Inc., Rockville, MD; B.B. Raju, U.S. Army RDECOM/TARDEC, Warren, MI

2:50 PM

**Acoustic Emission (AE) Monitoring of the Pulsatile Flow of Corn Oil in Water Suspension Through a Porous Medium**, G. C. Chungag, E.O. Ayorinde, Wayne State University, Detroit, MI

3:45 PM

**Evaluation and Detection of Bonding and Delamination in Sandwich Structures by Thin Film Thermal Sensor**, M. Khairul Alam, M.S. Anghelescu, Ohio University, Athens, OH; G. Eberle, Alcan Technology & Management Ltd., Neuhausen, Switzerland

4:10 PM

**Frequency and Temperature Aspects of Fatigue NDE of Some Sandwich Beams**, E.O. Ayorinde, Wayne State University, Detroit, MI

Room: L12

**Thermo-Mechanical Multifunctional Materials 1A-1B**

*Session Chair: Greg Odegard, Michigan Technological University, Houghton, MI*

2:00 PM

**Full Field Strain Analysis of Lightweight Aluminum Foam Hybrid Structures**, G. Reyes and A. Talakola, University of Michigan-Dearborn, Dearborn, MI

2:25 PM

**Damping, Tensile, and Impact Properties of Superelastic Shape Memory Alloy (SMA) Fiber Reinforced Polymer Composites**, J. Raghavan, T. Bartkiewicz, S. Boyko, M. Kupriyanov, University of Manitoba, Winnipeg, Canada; N. Rajapakse, University of British Columbia, Vancouver, Canada; B. Yu, Manitoba Hydro, Winnipeg, Canada

2:50 PM

**Cure Behavior of Dye-Doped Epoxy System for 2-Photon Fluorescence Imaging**, R.E. Toivola, A.C. Young, B.D. Flinn, A.K. Jen, University of Washington Material Science & Engineering, Seattle, WA

3:45 PM

**The Design of a Hybrid Material for Multifunctional Performance Using Advanced Analysis Techniques and Testing**, E. Askari, K. Nelson, O. Weckner, J. Xu, The Boeing Company, Seattle, WA; S.A. Silling, Sandia National Laboratories, Albuquerque, NM

4:35 PM

**Tensile and Interface Properties of Small Diameter Fibers Using Nano-Tensile Testing**, M. Kant, D. Penumadu, University of Tennessee, Knoxville, TN

Room: L10

**Composite Fatigue & Fracture 2A-2B**

*Session Chair: Golam Newaz, Wayne State University, Detroit, MI*

2:00 PM

**Mixed Mode Testing of Woven Fabric Polymer Composites**, T.P. Bruce, J.T. Wood, The University of Western Ontario, London, Canada

2:25 PM

**Damage Mapping of Fatigued Skin-Stringer Specimens in Three Dimensions**, V. Feret, P. Hubert, McGill University, Montreal, Canada; I. Paris, Bombardier Aerospace, St-Laurent, Canada

2:50 PM

**Stress Redistributions in Unit Cells of Fiber-Reinforced Composites with Interface Degradation**, V. Mondragón, L.A. Godoy, M.A. Pando, F.J. Acosta, University of Puerto Rico at Mayagüez, Mayagüez, PR

3:45 PM

**Tensile Failure of Fibrous Monolithic Composites**, D.M. Hrobak, M. Zupan, University of Maryland Baltimore County, Baltimore, MD

4:10 PM

**Strain-Life Fatigue Approach Applied to Glass Fibre Reinforced Polypropylene**, J. Rehkopf, Exponent, Farmington Hills, MI; A. Conle, Ford Motor Company, Dearborn, MI

4:35 PM

**Delamination Fracture Mechanisms of Continuous Fiber Polymer Composites Subjected to Mixed Mode Loading**, T.P. Bruce, J.T. Wood, The University of Western Ontario, London, Ontario, Canada

Room: Sultana-Mississippi

**Composites for the Automotive Industry 2A**

*Session Chair: Libby Berger, General Motors, Warren, MI*

2:00 PM

**Effect of Nanoclay Dispersion on Processing of Polyester Nanocomposite**, M. Ali Bashir, P. Hubert, McGill University, Montreal, Quebec

2:25 PM

**Multi-Task Research Program to Develop Commodity Grade, Lower Cost Carbon Fiber**, C.D. Warren, F.L. Paulauskas, F.S. Baker, C. Cliff Eberle, A. Naskar, Oak Ridge National Laboratory, Oak Ridge, TN

**Vendor Breaks**

Tuesday & Wednesday

10:30 AM - 11:00 AM

3:15 PM - 3:45 PM

Complimentary coffee will be available in the exhibition hall, sponsored by ASC.



Room: L5

## Composites from Agricultural Products 2A

Session Chair: Michael Kessler, Iowa State University, Ames, IA

2:00 PM

**Effect of Chemical Modifications of Bamboo Fibers on BFRP Composites**, R. Kumar, P.K. Kushwaha, Indian Institute of Technology Delhi, New Delhi, India

2:25 PM

**Studies on Application of Under Water Shock Wave on Jute Fiber and Its Characteristics**, G.M. Shafiur Rahman, H. Maehara, S. Itoh, Kumamoto University, Japan

Room: L3

## Carbon-Carbon Composites & Foams 1A-1B

Session Chair: Patrick Lake, Applied Sciences, Inc., Cedarville, OH

2:00 PM

**Nano-Aramid Fiber Reinforced Polyurethane Foam**, E.B. Semmes, Marshall Space Flight Center, MSFC, AL; A. Frances, E.I. DuPont de Nemours and Company, Richmond, VA

2:25 PM

**Preliminary Flexural Testing Results of Aluminum Foam-Polypropylene Interpenetrating Phase Composites**, N. Dukhan, N. Rayess, J. Hadley, The University of Detroit Mercy, Detroit, MI

2:50 PM

**Electrode Grade Composite Graphite From Coal Feedstocks**, E.B. Kennel, M. Mukka, A.H. Stiller, J.W. Zondlo, West Virginia University, Morgantown, WV

3:45 PM

**Structural Carbon Foams From Waste Coal**, E.B. Kennel, M. Mukka, O.A. Olajide, A.H. Stiller, West Virginia University, Morgantown, WV; R.A. Wolfe, Banner Elk, NC

4:10 PM

**Highly Graphitic C/C Composites for Thermal Management**, A. Palmer, P. Lake, D. Burton, M. Lake, Applied Sciences, Inc., Cedarville, OH

4:35 PM

**Machining, Bonding, Sealing, and Venting of Carbon Foam for Production Tooling**, G.D. Shives, D.J. Miller, R.L. Shao, A.K. Francis, D.M. Kaschak, GrafTech International, Parma, OH

Room: Sultana-Mississippi

## Nanocomposites: CNT/CNF Alignment 1B

Session Chair: Chuck Bakis, The Pennsylvania State Univ., University Park, PA

3:45 PM

**Processing of Hybrid Advanced Composites Utilizing Capillary-Driven Wetting of Aligned Carbon Nanotubes**, H. Cebeci, R. Guzman de Villoria, B.L. Wardle, D.S. Saito, N. Yamamoto, K. Ishiguro, E.J. Garcia, A.J. Hart, S. Wicks, Massachusetts Institute of Technology, Cambridge, MA

4:10 PM

**Tailored Alignment of Functionalized Multiwall Carbon Nanotubes in Epoxy**, A. Sharma, C.E. Bakis, Engineering Science and Mechanics Dept., Pennsylvania State University, University Park, PA; K. Well Wang, Mechanical Engineering Dept., Univ. of Michigan, Ann Arbor, MI

4:35 PM

**Electroconductive PET/SWNT Films By Solution Casting**, B.W. Steinert, D.R. Dean, Univ. of Alabama at Birmingham, Birmingham, AL

Room: L5

## Testing of Composites 1B

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

3:45 PM

**Tensile Specimen Design and Experimental Procedures for Characterizing Polymeric Composites Using X-Ray Based Micro-Tomography**, V. Kunc, B. Frame, Oak Ridge National Lab., Oak Ridge, TN; B.N. Nguyen, Pacific Northwest National Lab., Richland, WA; S. Case, Virginia Polytechnic Institute & State Univ., Dept. of Engineering Science and Mechanics, Blacksburg, VA; S. Young, D. Penumadu, Univ. of Tennessee, Civil & Environmental Engineering, Perkins Hall, Knoxville, TN

4:10 PM

**Functionalized Surface Single Fiber Pull-Out: Experiment**, S. Markkula, H. Malecki, M. Zupan, University of Maryland Baltimore County, Baltimore, MD

4:35 PM

**Comparisons of Interfacial Shear Strength Measurements for Bonded Materials and Composite Materials**, A. Krishnan, L.R. Xu, Vanderbilt University, Nashville, TN

## A Night at the Peabody

6:00 PM – 8:00 PM

Participate in this SAMPE/ASC joint social event, a fun gathering featuring cocktails, food and great company. After this joint get-together, pursue your own plans of dinner and fun on Beale Street.

Buses will shuttle attendees to and from the Peabody Hotel. Buses will begin loading at 5:45 PM at the Memphis Marriott Hotel Lobby Level and will run continuously until 9:00 PM for the convenience of those visiting Beale Street. If you are planning to stay out on Beale Street later than 9:00 PM, trolley can return you to the Memphis Marriott Downtown Hotel until 10:30 PM. The trolley runs every 5 minutes, with a pick-up station at the Peabody Hotel and is \$1 per ride.

Tickets to this event are included with full registration. Additional tickets can be purchased at the SAMPE Registration area for \$55.



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Room: L10

**Featured Lecture: Ionic Polymer-Metal Composite as a New Actuator and Transducer Material**

8:15 AM - 9:00 AM

Presenter: Kwang Kim, University of Nevada, Reno, NV

Moderators: Ron Gibson, University Nevada-Reno, Reno, NV and Nick Gianaris, General Dynamics Land Systems, West Bloomfield, MI

Ionic Polymer-Metal Composites (IPMCs) are a unique polymer transducer that when subjected to an imposed bending stress, exhibits a measurable charge across the chemically and/or physically placed effective electrodes. The current state-of-the-art IPMC manufacturing technique incorporates two distinct preparation processes: initial compositing process and subsequent surface electroding process. Due to different preparation processes, morphologies of precipitated platinum are significantly different. In this presentation, the basic principles of IPMC actuator/transducer and its manufacturing techniques will be discussed.

Room: Sultana-Mississippi

**Nanocomposites: Electrical and Thermal 1A-1B**

Session Chair: Greg Yandek, Air Force Research Lab, Edwards AFB, CA; Patrick Lake, Applied Sciences, Inc., Cedarville, OH

9:15 AM

**Nanostructured Thermal Interface Pastes for Microelectronic Cooling**, C. Lin, D.D.L. Chung, University at Buffalo, State University of New York, Buffalo, NY

9:40 AM

**Adherent Carbon-Based Films Exhibiting High Electrical Conductivity**, Y. Yamada, D.D.L. Chung, University at Buffalo, State University of New York, Buffalo, NY

10:05 AM

**Dielectric Properties of ZnO/PVDF Flexible Composites**, C. Dagdeviren, M. Papila, Sabanci University, Istanbul, Turkey

11:00 AM

**Polyimide Nanocomposites for Tunable Coefficient of Thermal Expansion**, G.R Sharma, M.R. Coleman, Cora Lind, The University of Toledo, Toledo, OH

11:25 AM

**Carbon Nanotube Reinforced Polymers for Multifunctional Composite Structures**, S. Chung, R. Foedinger, Materials Sciences Corporation, Horsham, PA; M. Weisenberger, M. Meier, University of Kentucky Center for Applied Energy Research, Lexington, KY; J.K. Roberts, U.S. Army Aviation and Missile Research Development and Engineering Center Redstone Arsenal, AL

11:50 AM

**Electrical Conductivity Measurements and Lightning Strike Results of Nano/Macromaterials Enhanced Polymeric Composites**, T. Gibson, University of Dayton Research Institute, Dayton, OH; J. Chase Fielding, Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright-Patterson AFB, OH

Room: L12

**Nanocomposites: Analysis and Characterization 1A-1B**

Session Chair: Chuck Bakis, The Pennsylvania State Univ., University Park, PA

9:15 AM

**Mechanical Characterization of Multi-Wall Carbon Nanotube/Poly(Methyl Methacrylate) Nanocomposites: A Metrology Comparison Study**, E.U. Onyegam, J.H. Koo, J.H. Im, P.S. Ho, Austin, TX

9:40 AM

**A Scaling Parameter for Determining Exfoliation Efficiency in Nanocomposites**, H.A. Stretz, V.D.N. Palla, Tennessee Technological University, Cookeville, TN

10:05 AM

**Chemistry of Mechanical Performance: Memory, Self-Healing Behavior, and High Impact Resistance in Nanocomposites**, C.E. Powell, G.W. Beall, C. Booth, Texas State University-San Marcos, San Marcos, TX

11:00 AM

**Multi-scale Modeling of Bending Behavior of Carbon Nanotube-Reinforced Composites**, L. Cui, L. Sun, Beijing University of Aeronautics and Astronautics, Beijing, China

11:25 AM

**Dynamic Mechanical Analysis of Graphite Platelet and Nanoclay Reinforced Vinyl Ester, and MWCNT Reinforced Nylon 6,6 Nanocomposites**, A. Almagableh, S. Gupta, P. Raju Mantena, A. Al-Ostaz, Composite Structures and Nano-Engineering Research, The University of Mississippi, University, MS

11:50 AM

**Uncertain Mechanical Properties of Nanocomposite Materials**, L.R. Xu, A. Krishnan, C.M. Lukehart, Vanderbilt University, Nashville, TN

Room: L5

**Thermoplastic Composites 1A-1B**

Session Chair: Uday Vaidya, The University of Alabama at Birmingham, Birmingham, AL

9:15 AM

**Manufacturing Study of Unidirectional AS4D/PEKK Tape**, C.Ó. Brádaigh, R. Canavan, J. Lee, J-M. Bocquel, P. Mallon, ÉireComposites Teoranta, An Choill Rua, Indreabhán, Co. Galway, Ireland

9:40 AM

**Processing and Mechanical Characterization of Thermoplastic Nanocomposites**, S. Roy, K. Narasimhan, University of Alabama, Tuscaloosa, AL

10:05 AM

**The Effect of Forming Processes on the Environmental Resistance of Carbon/PPS**, S. Wijskamp, A. Leusink, R. Lenferink, W. Kok, Ten Cate Advanced Composites, The Netherlands

11:00 AM

**Continuous Reinforced Thermoplastic Composites for Aircraft Applications**, M. Favaloro, Ticona Engineering Polymers, Amesbury, MA

11:25 AM

**A Comparison of Maximum Use Temperatures for High Performance Thermoplastic Composites**, H. Ramathal, M. Favaloro, Ticona Engineering Polymers, Amesbury, MA

11:50 AM

**Full Field Strain Analysis of Thermoplastic Woven Composites**, G. Reyes and S.T. Mane, University of Michigan-Dearborn, Dearborn, MI

**Breaks**

10:30 AM - 11:00 AM

3:15 PM - 3:45 PM

Room: L10

**Sandwich Structures 1A-1B**

Session Chair: Alan Nettles and Justin R. Jackson, NASA Marshall Space Flight Center, MSFC, AL

9:15 AM

**Study on Failure Mode of Aluminum/PU Foam Sandwich Plate Under Bending Loads**, L. Sun, W. Chen, Beijing University of Aeronautics and Astronautics, Beijing, P.R. China

9:40 AM

**Assessment of Extruded Polystyrene Foam for Sandwich Composite Applications**, C.C. Wellnitz, I. Miskioglu, ME-EM Department, Michigan Technological University, Houghton, MI; J.D. Zawisza, The Dow Chemical Company, Dow Chemical U.S.A., Midland, MI

10:05 AM

**Cyclic Response of Pin-Reinforced Foam Core Sandwich Panels**, S.M. Storck, M. Zupan, University of Maryland Baltimore County, Baltimore, MD; D.D.R. Cartie, Cranfield University, Cranfield, UK

11:00 AM

**A Fastener-Free Primary Structural Joint Between Sandwich Panels**, J.H. Fogarty, The Boeing Company, St. Louis, MO

11:25 AM

**Modeling High Velocity Impact of Fire Exposed Sandwich Composites**, J. Mosbrucker, M. Hanson, L. Gibbon, and C.A. Ulven, North Dakota State University, Fargo, ND

11:50 AM

**Compression After Impact Testing of Sandwich Structures Using a Four Point Bend Test**, A.T. Nettles, J.R. Jackson, NASA Marshall Space Flight Center, Huntsville, AL; T.S. Gates, NASA Langley Research Center, Hampton, VA

Room: L14

**Requirements for the Next Generation of Composites Engineers - Panel**

9:15 AM - 10:30 AM

Panel Moderator: Brad Lucht, Honeywell FM&T, Kansas City, MO

What should engineering education be like in the future to prepare the next generation of composites engineers? Modifying the engineering education system will require the continuous and ongoing interaction between engineers in industry and educators in academe.

What role can SAMPE play to facilitate the exchange of ideas and information between these groups?

The panelists will discuss their views on what academia can do to provide the composites engineers that industry needs, and what industry can do to support the development of academic programs that will produce these engineers.

Panelists:

- Ben Wang, Florida State University
- Les Kramer, Lockheed Martin Missiles and Fire Control
- Shridhar Yarlagadda, University of Delaware
- Gail Hahn, Boeing Phantom Works
- Beckry Abdel-Magid, Winona State University
- Peter Wu, Spirit AeroSystems

**Breaks**

10:30 AM - 11:00 AM

3:15 PM - 3:45 PM

Room: L3

**Structurally Integrated Energy Harvesting/Storage Capabilities - DoD Workshop**

9:15 AM - 5:00 PM

Organizers: B.L. ("Les") Lee, Air Force Office of Scientific Research; James Thomas, Naval Research Lab; and Bruce LaMattina, Army Research Office

Usable electrical energy can be harvested from ambient solar radiation, waste heat, and mechanical vibrations relying on photovoltaic, thermoelectric/thermionic, and piezo/magneto-electric means respectively. Harvested electricity can, in turn, undergo immediate in-situ usage (e.g. self-powered sensors), or be stored in capacitors or batteries for in- or ex-situ usage. Batteries, capacitors or other micro-devices for energy storage as well those elements used for energy harvesting can be embedded or integrated into load-bearing structures in various forms such as thin film laminates or surface coating layers.

Speakers and Presentations:

Minoru Taya, University of Washington - Keynote: "Energy Harvesting and Storage Systems and Their Integration to Aero Vehicles"

Bruce Lanning, ITN Energy Systems: "Multifunctional Power Systems Using Flexible Thin Film Solid State Lithium Batteries and Polycrystalline CIGS Solar Cells"

Jerry Fleming, Luna Innovation: "Development of High Power Density Thermoelectric Modules for a Miniaturized Thermal Energy Harvesting System"

Greg Carman, UCLA: "An Overview of Mechanical and Thermal Energy Harvesting Systems Developed at UCLA"

Max Shtein, University of Michigan: "Fiber-Based Devices for Solar and Thermal Energy Harvesting Composites for Aerospace Applications"

Tom Hahn, UCLA: "Multifunctional Energy Harvesting & Storage Structural Composites"

Marty Dunn, University of Colorado: "Design Methods for Multifunctional Composites with Energy Harvesting and Storage Functionalities"

Ann Marie Sastry, University of Michigan: "Intercalation of Li in Structural Materials: Toward Structural Batteries for Compact Power"

Brian Sanders and Greg Reich, Air Force Research Lab: "Structurally Integrated Thermal Energy Harvesting System"

Eric Wetzel, Army Research Lab: "Structural Batteries and Capacitors for Army Applications"

Siddiq Qidwai, Naval Research Lab: "Structurally Integrated Energy Storage Composites for Unmanned Underwater Vehicles"

Room: L14

**High Temperature Resins & Composites 1B**

Session Chair: Stan Prybyla, Breakthrough Technology Development, Brecksville, OH

11:00 AM

**Evaluation of Toughness and Hot/Wet Performance of Epsilon Resin System**, W.H. Li, S. Lehmann, Henkel Corporation, Bay Point, CA

11:25 AM

**Improved Matrix for Carbon Fiber Composites for Aircraft**, S.E. Bender, J. Economy, University of Illinois at Urbana-Champaign, Urbana, IL

Room: L10

**Featured Lecture: Polymer Nanocomposites Research in Canada**

1:15 PM - 2:00 PM

Presenter: Suong V. Hoa, Concordia University, Montreal, Quebec, Canada  
Moderators: Ron Gibson, University Nevada-Reno, Reno, NV and Nick Gianaris, General Dynamics Land Systems, West Bloomfield, MI

Research on polymer nanocomposites in Canada has been focused mainly on the incorporation of nanoparticles such as nanoclays, carbon nanotubes, carbon nanofibers into polymeric systems including thermoplastics such as epoxies, polystyrene, polylactic acid (PLA), and polyethylene terephthalate (PET). Apart from industrial uses, significant applications are for aerospace. Significant advances have been made for the incorporation of clays into epoxies. Different models have been developed:

- Model for the effects of different mixing parameters (temperature and speed of mixing) for the high speed mixing process.
- Model for the absorption of water into polymer nanocomposites
- Model for the increase in fracture toughness due to fine dispersion of particles.

Incorporation of carbon nanotubes into epoxies have been shown to form a sensor network that can provide more consistent detection of occurrence of cracks in composite laminates as compared to strain gauges.

Room: L5

**Manufacturing & Processing Advances 3A**

Session Chair: Dale Brosius, Quickstep Technologies, Brighton, MI

2:00 PM

**RSRM Nozzle Flex Boot Material Replacement**, C.J. Jordan, D.E. Goringe, ATK Launch Systems, Promontory, UT



2:25 PM

**PBI-NBR Closed Mold Fabrication Process Development**, D. Goringe, C. Jordan, ATK Launch Systems, Promontory, UT



2:50 PM

**Fabrication of Silicon Carbide and Refractory Metal Based Composites for Nuclear Applications Using Polymer Infiltration and Pyrolysis**, A.K. Singh, R.P. Singh, School of Mechanical and Aerospace Engineering, Oklahoma State University, OK

Room: Sultana-Mississippi

**Nano-Industrial Applications 1A**

Session Chair: Patrick Lake, Applied Sciences, Inc., Cedarville, OH

2:00 PM

**Industrial Applications for Carbon Nanofiber Reinforced Polymer Composites**, C. Leer, P. Lake, D. Burton, M. Lake, Applied Sciences, Inc., Cedarville, OH

2:25 PM

**Metal-Free Thermal Conductive Polymers**, E. Hammel, X. Tang, A. Eder, Electrovac AG, Klosterneuburg, Austria

2:50 PM

**Smart Nanocomposites for Industrial Health Monitoring**, G. Maheshwari, N. Mallik, S. Narayanan Sundaramurthy, M.Dadhania, W. Li, D. Hurd, Y.H. Yun, M.J. Schulz, J. Abot, Wondong, E. Head, V. Shanov, C. Jayasinghe, P. Salunke, L. Lee, University of Cincinnati, Cincinnati, OH; S. Yarmolenko, J. Sankar, North Carolina A&T State Univ., Greensboro, NC

Room: L14

**Thermoplastic Composites 2A-2B**

Session Chair: Selvam Pillay, The University of Alabama at Birmingham, Birmingham, AL

2:00 PM

**Prestressed Carbon/Fiber Thermoplastic Electromagnetic Railgun**, A. Littlefield, J. Root, R. Mysliwiec, K. Olsen, US Army RDECOM-ARDEC Benét Laboratories, Watervliet, NY



2:25 PM

**Processing and Characterization of Thin-Walled Long Fiber Reinforced Thermoplastic (LFT) Composites**, H. Ning, S. Pillay, U. Vaidya, J.B. Andrews, The University of Alabama at Birmingham, Birmingham, AL

2:50 PM

**Development of a Thermoplastic Prepreg Manufacturing Process by Continuous Resin Infusion**, J.C. Ragone, K. Mallick, University of Michigan-Dearborn, Dearborn, MI

3:45 PM

**Influence of Nanoclay Addition on Properties of Unsaturated-Polyester Nanocomposite Gel Coat System**, P. Jawahar, K. Kanny, Durban University of Technology, Durban, South Africa; M. Balasubramanian, Indian Institute of Technology Madras, Chennai, India

4:10 PM

**Damping Behavior of Long Fiber Reinforced Thermoplastic (LFT) Composites**, A. Goel, Pennsylvania State University, University Park, PA; K.K. Chawla, U.K. Vaidya, University of Alabama at Birmingham, Birmingham, AL

4:35 PM

**Preparation and Characterization of Commodity Thermoplastics Reinforced with Natural Fiber Byproduct**, M.A. Fuqua, S. Huo, and C.A. Ulven, North Dakota State University, Fargo, ND

Room: L12

**Multifunctional Materials with Integral NDE 1A**

Session Chair: Soma Perooly, Proto Manufacturing Inc., Ypsilanti, MI

2:00 PM

**Direct Laser Fabrication of Conical Si Tips With Nanoscale Sharpness**, J.P. Moening, D.G. Georgiev, The University of Toledo, Toledo, OH

2:25 PM

**Effect of Ion Bombardment on the Properties of Magnetron Sputtered Samarium Cobalt Films on Chromium Underlayers**, M.K. Ghantasala, Western Michigan University, Kalamazoo, MI; J. Wang, Swinburne University of Technology, Hawthorn, VIC, Australia; S. Perooly, Proto Manufacturing Inc., Ypsilanti, MI



Room: L10

**High Temperature Resins & Composites 2A-2B**

Session Chair: Stan Prybyla, Breakthrough Technology Development, Brecksville, OH

2:00 PM

**Influence of Ply Stacking Sequence on Anisotropic Oxidation Growth in Laminated Composites,**



G.P. Tandon, W.R. Ragland, University of Dayton Research Institute, Dayton, OH; G.A. Schoeppner, Air Force Research Laboratory/RXBC, WPAFB, OH

2:25 PM

**Thermal Oxidative Barrier Coating for Polymer Matrix Composites,**



W.R. Ronk, T.A. Bullions, GE Aviation, Cincinnati, OH

2:50 PM

**High-Temperature Finishes for Silicon Carbide-Reinforced Composites,**



R.E. Allred, J.-M. Gosau, J.P. Barlow, Adherent Technologies, Inc., Albuquerque, NM

3:45 PM

**Comparison of Physical and Mechanical Properties of High-Temperature Resin Transfer Molding (PETI-330, PETI-375, AFR-RTM, and AFR-RTM Modified),**



T. Storage, Materials & Manufacturing Directorate, WPAFB, OH; T. Gibson, University of Dayton Research Institute, Dayton, OH

4:10 PM

**Thermo-Oxidative Characterization of BMI Subjected to Service Environment,**



S. Putthanarat, G.P. Tandon, University of Dayton Research Institute, Dayton, OH; G.A. Schoeppner, AFRL/RXBC, WPAFB, OH

Room: Sultana-Mississippi

**Nanocomposites: Fire Behavior 1B**

Session Chair: Antonio Avila, Universidade Federal de Minas Gerais, Horizonte, MG, Brazil

3:45 PM

**Residual Impact Strength of Nanocomposites after Intense Heat Exposure,**

A.F. Ávila, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil; J.H. Koo, The University of Texas at Austin, Austin, TX; A.Q. Bracarense, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil

4:10 PM

**Kinetics of Thermal Degradation of Thermoplastic Polyurethane Elastomer Nanocomposites,**

D.W.K. Ho, J.H. Koo, J.C. Lee, O.A. Ezekoye, The University of Texas at Austin, Austin, TX

4:35 PM

**Enhancement of Flame Retardancy in Epoxy and Bismaleimide/Carbon Fiber Composites by the Incorporation of Buckypaper on the Composite Surface,**

Q. Wu, J. Bao, C. Zhang, Z. Liang, B. Wang, Florida State University, Tallahassee, FL

Room: L5

**Joints in Composite Structures 1B**

Session Chair: Guru Kathawate, G.R. Kathawate & Associates, Inc., Lake Orion, MI

3:45 PM

**Hybrid Composite Joining Techniques,**



F. Thomas, E. Semmes, Marshall Space Flight Center, MSFC, AL

4:10 PM

**Bearing Strength and Failure Behavior of Bolted Stitched CFRP Laminates,**

A. Yoshimura, Y. Iwahori, Advanced Materials Group, Aerospace Research and Development Directorate, JAXA, Tokyo, Japan

4:35 PM

**Joining Thick Composite Panels with the Use of Unitary 3-D Woven Couplers and Patches,**

A. Bogdanovich, D. Mungalov, 3TEX, Inc., Cary, NC; O.O. Ochoa, S.M. Lee, Texas A&M University College Station, TX

Room: L12

**Resins & Adhesives 1B**

Session Chair: Terry Tsuchiyama, The Boeing Company, Seattle, WA

3:45 PM

**Advanced Epoxy System for Large Scale Composite Ship Component Manufacturing Using the VARTM Process,**

J. Pacanovsky, Triangle Polymer Technologies, Inc., Triangle Park, NC; A. Kelkar, R. Bolick, North Carolina A&T State University, Greensboro, NC

4:10 PM

**Results of an Out Time Study of a New 350°F Cure Structural Adhesive Film,**

P.E. Rajtar, D. Salnikov, 3M Aerospace and Aircraft Maintenance Division, St. Paul, MN

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## Registration Hours

Monday, September 8	7:30 AM – 5:00 PM
Tuesday, September 9	7:30 AM – 5:00 PM
Wednesday, September 10	7:30 AM – 5:00 PM
Thursday, September 11	7:30 AM – 1:30 PM

Registration is located right outside of Ballrooms A&B on the Exhibit Hall Ballroom Level in the Cook Convention Center.

## Exhibit Hours

Tuesday, September 9	10:00 AM – 4:00 PM
Wednesday, September 10	10:00 AM – 4:00 PM

Exhibits are located in Ballroom A on the Exhibit Hall Ballroom Level in the Cook Convention Center. Exhibits are closed Monday and Thursday.

## On-site Registration

Do not fill out the pre-registration form that is in the Preliminary Program. You must fill out an on-site registration form when you are ready to register. Payment in full must be made at the time of registration. Acceptable forms of payment are cash, check, VISA, MasterCard, American Express and Discover.

## Exhibits Hall Admission

ALL MUST BE REGISTERED AND BADGED TO ENTER THE EXHIBIT HALL. Conference registrants are automatically admitted to the exhibits with their badges. Exhibit hall admission is free, and those not attending the conference, but who desire admission, must register at the SAMPE registration area located right outside of Ballrooms A&B on the Exhibit Hall Ballroom Level in the Cook Convention Center.

## Exhibit Hall Rules

People under 13 years of age are not permitted on the exhibit floor at any time regardless of affiliation or circumstances. This rule applies to exhibitors as well as attendees. Photos may only be taken with the permission of the booth personnel. There is no smoking in the Convention Center.

## ITAR Regulations – Restricted Papers



Bring the required identification, proof of employment and certification credentials as listed on page 6, to the SAMPE Clearance counter at the SAMPE Registration area. Your documents will be verified and you will be provided with a stamp indicating your ITAR clearance. Photo ID will be checked against your ITAR badge before admittance is granted to any ITAR presentation.

### Vendor Breaks

Tuesday & Wednesday  
10:30 AM - 11:00 AM  
3:15 PM - 3:45 PM

Complimentary coffee will be available in the exhibition hall, sponsored by ASC.



## Cancellation/Refund/Substitution Policy

No refund will be given for failure to attend, late arrival, unattended events or early departure from the meeting. Refund requests must be in writing in advance of the show according to the refund guidelines.

Refunds are processed after the conference. There is no charge for making a substitution. The appropriate member/non-member rate will apply to the attending substitute.

## Session Chairs, Panel Moderators, and Speakers Meeting, Room 202.

It is very important that all paper presenters, session chairs, panel moderators and panelists attend the speakers meeting at 7:00 AM on the day of your session, presentation or panel. This will provide you with the opportunity to meet the other session/panel participants, coordinate with your session chair or panel discussion moderator, arrange for pre-loading of presentations, and also hear announcements from the technical program chairs.

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Check in here for your assignment and instructions.

## Notes

- No Phone, Camera or Recording Devices
- For the courtesy of our speakers, these devices are not permitted during any conference program.
- All presentations are in English.
- Attire at all events is business casual.
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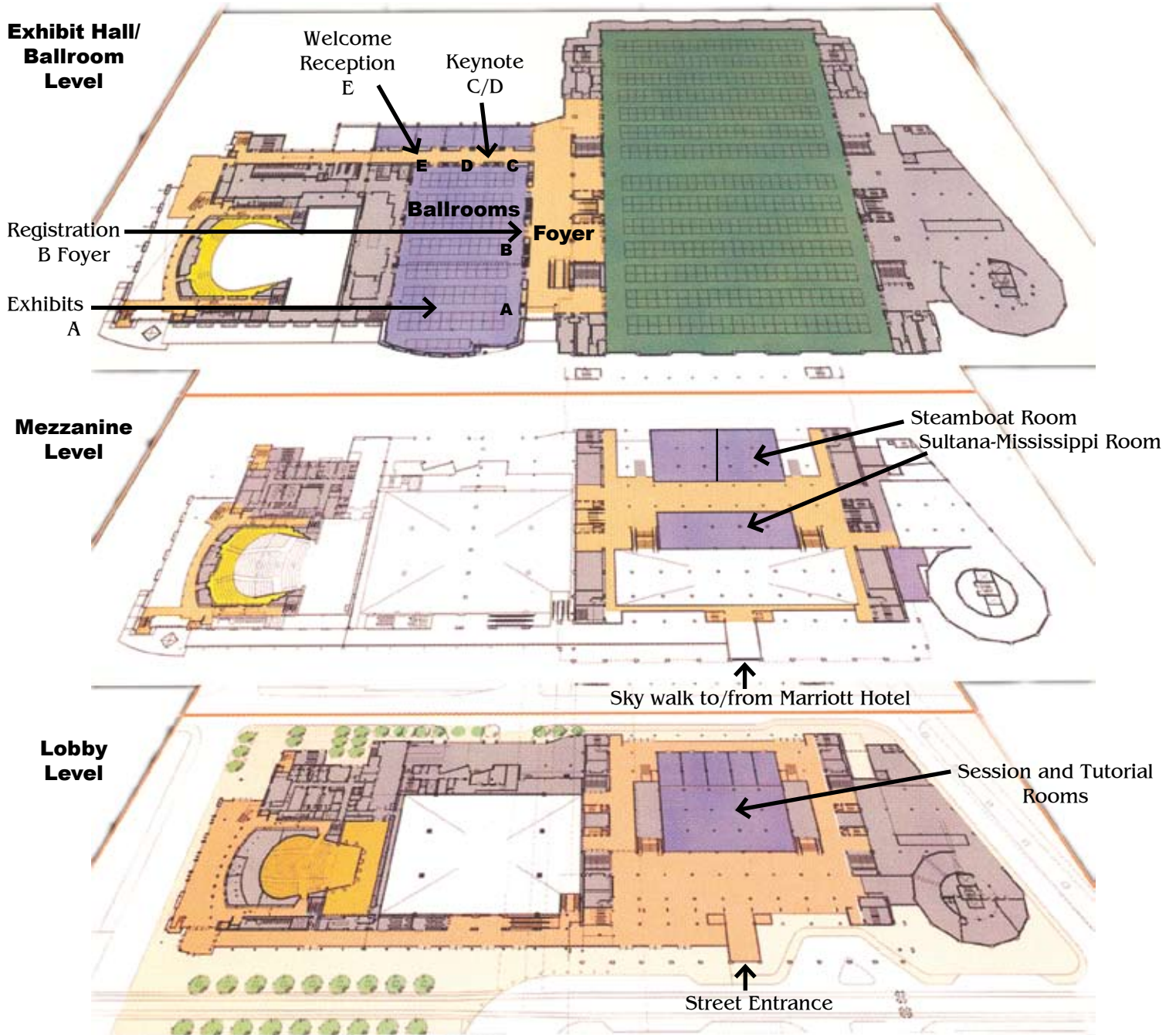
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# Cook Convention Center Layout





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 1366 Norwich Road, PO Box 264  
 Plainfield, CT 06374  
 +1 860-564-7817 • [www.prepregs.com](http://www.prepregs.com)  
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 Stockton, CA 95206  
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T204

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510

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Evonik, Röhm GmbH, Evonik Foams, Inc. maintains the world leadership position as manufacturer/seller of the widest range of structural sandwich panel foam core, marketed under the trade name ROHACELL®.

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T212

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T315



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**Hybrid Plastics, Inc.** 413  
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Hattiesburg, MS 39401  
+1 601-544-3466 • [www.hybridplastics.com](http://www.hybridplastics.com)

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**Integran Technologies, Inc.** 324  
1 Meridian Road  
Toronto, Ontario, M9W 4Z6 Canada  
+1 416-675-6266 • [www.integran.com](http://www.integran.com)

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**ITT Corporation (Formerly EDO Corporation)** 407  
Integrated Structures  
8 Tower Bridge  
161 Washington Street, Suite 830  
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+1 631-630-4215 • [www.ITT.com](http://www.ITT.com)

ITT Integrated Structures (IS) Value Center provides full design, analysis, prototyping and production fabrication of advanced composite structural systems. ITT has a dedicated and experienced staff of specialists developing optimized mechanized and static structures. ITT's team has proven designs with high strain, high modulus, and post buckled, mini-sandwich and hybrid structures, utilizing state of the-art 3D design and analysis tools. ITT-IS products include primary and secondary aerospace structures, holding tanks, pressure vessels, and launch tubes. ITT's capabilities include: braided structures, net-shape pre-forms, precision filament wound structures, pre-preg stiffened and sandwich structures, resin transfer molding (RTM), Resin Film Infusion (RFI), Vacuum assisted RTM (VaRTM), thermoset and thermoplastic composites, special applications and materials.

**JPS Composite Materials Corp.** T503  
2200 S. Murray Avenue  
Anderson, SC 29624  
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Blacksburg, VA 24060  
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**Magnolia Plastics, Inc.** 306  
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+1 770-720-0526 • [www.norralplastics.com](http://www.norralplastics.com)  
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#### NOVEMBER 2008

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#### MARCH 2009

23-25, SAMPE Europe Technical Conference, 30<sup>th</sup> International Jubilee Conference and Forum (SEICO 09), Hotel Mercure, Paris, Porte de Versailles, France. Phone: +33 5-6107-7766; Fax: +33 5-6106-7628; E-mail: [sebo@sampe-europe.org](mailto:sebo@sampe-europe.org); Web Site: [www.sampe-europe.org](http://www.sampe-europe.org)

#### MAY 2009

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#### OCTOBER 2009

19-22, SAMPE Fall Technical Conference, Wichita, KS. Phone: +1 626-331-0616 (ext 610); E-mail: [priscilla@sampe.org](mailto:priscilla@sampe.org); Web Site: [www.sampe.org](http://www.sampe.org)

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