



Welcome to



Jonghwan Suhr Joins CCM Affiliated Faculty

CCM's newest affiliated faculty member, Jonghwan Suhr, didn't have to think long or hard about accepting a faculty appointment at the University of Delaware—the mechanical engineer knew that UD was one of the best places in the world to do composites research.

“CCM is an internationally known place for composites,” Suhr said, “and I was attracted by three things. The first is the Center’s great infrastructure for composites research and education, including state-of-the-art facilities and research technicians to train my students in its use.”

“Second, through CCM I have access to experts at dozens of companies, as well as the Department of Defense, who can give me input on practical problems and how I can help solve them. And, finally, I now have a much better chance to transfer the technology developed in my lab to the real world through close collaboration with research professionals at CCM.”

After earning his Ph.D. at Rensselaer Polytechnic Institute, Suhr spent three years on the faculty at the University of Nevada, Reno, where he established a strong research program in the use of nanotechnology to introduce functionality into traditional fiber-reinforced polymer composites.

TOP STORY (Continued)

In a current project with Boeing, he is applying nanotechnology to aircraft structures to enhance damping and reduce noise.

“Composite sandwich structures are lightweight and strong,” Suhr says, “but carbon nanotubes can enable us to improve their other properties.”

In 2009, Suhr was awarded a Faculty Early Career Development program award from the National Science Foundation for research aimed at developing new materials that mimic dolphins’ skin.

“We can learn much from observing nature,” Suhr said. “Dolphins move through the water very rapidly, and we believe that by creating new materials with properties similar to those of their skin, we can create skin materials that reduce drag force by increasing aerodynamic efficiency.”

Applications include wind turbine blades and wing structures of unmanned air vehicles.

“We’re very excited to have Prof. Suhr join the faculty in our **Department of Mechanical Engineering**,” said chairperson Annette Karlsson. “He brings tremendous energy and a wealth of new ideas.”

CCM director Jack Gillespie agrees. “Jonghwan has already established research projects with NSF, Boeing and DoD in composites and is interested in expanding those collaborations with other industrial members of our consortium and with researchers at the Army Research Lab as part of our Materials Center of Excellence,” he said. “He’s a great addition to CCM. We hope our ongoing search for an additional three faculty will be equally successful.”

Article by Diane Kukich

CCM Reports Successful Showing at AUVSI Conference

The Center for Composite Materials was recently represented at the Association of Unmanned Vehicles Systems International (AUVSI) Conference in Denver, Colo., where members of the military and academia focused on developing projects and technologies for unmanned water, land and air vehicles.

*Dan Molligan,
CCM Assistant
Director
for Application
Development*



OTHER NEWS

Dan Molligan, Assistant Director for Application Development at CCM, was on hand to showcase the Center's lightweight, all-carbon composite top plate manufacturing feasibility article, funded by TARDEC.

The ground combat vehicle top plate, slated for fabrication later this year by Sioux Manufacturing, Inc., a CCM Consortium member, was viewed as a success and garnered quite a bit of attention from the conference's attendees, according to Molligan, who said, "There were many inquiries about the top plate and discussions of how this technology was positioned for future military applications. Several of the land based unmanned system developers were intrigued about how CCM exploited braided technology and lightweight core construction to meet the needs of these damage tolerant applications."

"Several of the land based unmanned system developers were intrigued about how CCM exploited braided technology and lightweight core construction to meet the needs of these damage tolerant applications."



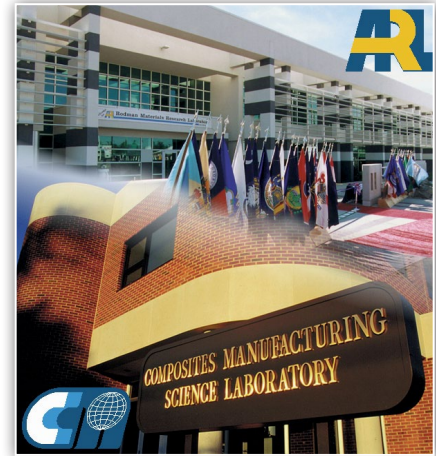
Center Receives Funding for Fourth Year of CART Collaborative Program

On August 23, 2010, CCM received \$2.6M for Year 4 of its five-year, \$25M Composites Applied Research and Technology (CART) Collaborative Program.

One of several Army Centers of Excellence at CCM, CART was established in April 2007 through a cooperative agreement with the Army Research Laboratory (ARL). A comprehensive interdisciplinary program of collaborative research, personnel exchange, and facilities-sharing, CART provides a flexible collaborative mechanism to bridge the gap between basic research and applications-level technology.

According to CCM director Jack Gillespie, the program focuses on maturation of promising research, establishment of generic capabilities, rapid transition of advanced lightweight multifunctional composites for combat, tactical, and air manned/unmanned vehicles, and individual soldier systems for the Future Force.

The underpinning research philosophy of CART is a systems-by-design approach that relies on the creation and use of generic simulation and modeling tools to accelerate the insertion of new multifunctional composite materials into Army systems. With this approach, materials, processes, properties, and component design are considered concurrently rather than sequentially. Physics-based modeling and simulation are used to predict material properties; understand, optimize, and automate processing; and develop the needed mechanics and design methods.



UDaily: UD's Tsu-Wei Chou Edits High Impact Factor Journal

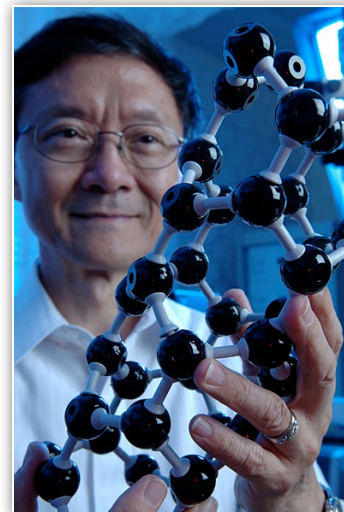
by Karen B. Roberts

10:20 a.m., Sept. 13, 2010----The Thomson Institute for Scientific Information (ISI) recently released the 2009 Impact Factors of all scientific journals in the world. Tsu-Wei Chou, Pierre S. du Pont Chair of Engineering at the University of Delaware, is editor-in-chief of the international journal **Composites Science and Technology** (CSTE), which was again ranked No. 1 among the 23 composites journals in the materials science area.

Impact factor is a quantitative tool for comparing different journals within a certain field. Results are based on a three-year period, in this case 2007-2009.

“The impact factor of a journal measures the extent to which the papers published in the journal are cited or referenced by authors in their research work,” explains Chou.

[Click here to view full story in UDaily](#)



Tsu-Wei Chou
Photo courtesy of UDaily

Richard Wool
Photo courtesy of UDaily



UDaily: Wool Wins ACS National Award for Affordable Green Chemistry

by Karen B. Roberts

9:56 a.m., Aug. 30, 2010----Richard P. Wool is a 2011 recipient of the **American Chemical Society** (ACS) award for Affordable Green Chemistry. Wool is a professor in the Department of Chemical Engineering and director of the Affordable Composites from Renewable Research (ACRES) program at the University of Delaware.

The award, sponsored by the Dow Chemical Company and endowed by Rohm and Haas Company, is given annually in recognition of scientific discovery of new eco-friendly chemistries with the potential to enable products or manufacturing processes that are less expensive than existing alternatives.

Paul Anastas, assistant administrator for the Environmental Protection Agency's Office of Research and Development (ORD) and science adviser to the agency, nominated Wool for his work in the development of biobased materials from renewable resources.

[Click here to view full story in UDaily.](#)

OTHER NEWS

CCM's Artistic Works in Progress

In anticipation of the completion of CCM's founding fathers portraits, we inquire about the technique artist Lisa Bartolozzi has chosen for the creation of these magnificent works of art. Lisa explains, "The technique involves a traditional oil ground on a rigid support made of wood. I then developed the images with a "dead palette" of earth tones -yellow ochre, raw sienna, burnt sienna, burnt umber, raw umber and white. I am now thinly layering cool dark tones over these using manganese black and Payne's gray. The lights are also manipulated with warm and cool color tones. The overall color palette will be in "grisaille" or a painting done in light and dark tones, with minimal color. Typically this was done as an underpainting, and layers of opaque and eventually transparent colors were layered over the "dead palette" to bring it into a full color range. I am leaving the portraits in grisaille for this series. Formulas, reflective of the professor's works at the time they founded the department, will be evident in the negative space or background in abstracted designs."

Please check back often as we hope to unveil Lisa's amazing artwork at the Center for Composite Materials in the coming months.



Artist Lisa Bartolozzi presented a preview of the CCM Founding Fathers portraits during CCM's 35th Anniversary celebration held in September 2009.

CONSORTIUM MEMBERS

We would like to thank **EADS North America**, Arlington, VA, for becoming the newest member of our University-Industry Consortium. We also wish to thank **Honeywell Aerospace Advanced Technology**, Morristown, NJ, **Owens Corning Science & Technology**, Novi, MI, and **V System Composites**, San Diego, CA, for the recent renewal of their consortium memberships.



To learn more about the benefits of becoming a member, please visit us on the web at

www.ccm.udel.edu/Consortium/benefits.html

METTLER-TOLEDO NEWS: New Flash DSC (FDSC)

Please join us at one of the 11 seminar locations in the USA to preview applications made possible for the first time by the new Flash DSC (FDSC) just introduced at North American Thermal Analysis Society (NATAS) a few weeks ago.

An ideal complement to DSC, FDSC extends DSC's capabilities by determining energy absorbed or released by a sample as it is rapidly heated or cooled. FDSC can analyze reorganization processes that were previously impossible to measure with traditional DSC. FDSC is capable of measuring heat flow in micrograms of material as much as 1000 times faster than conventional DSC.

With cooling rates of up to 4,000 K/s and heating rates up to 40,000 K/s, FDSC is an ideal tool for studying crystallization kinetics, for example, and many other fast reactions. Thermal analysis experts will explain actual FDSC applications related to the characterization of modern materials and optimization of production processes:

- Detailed analysis of structure formation processes in materials
- Comprehensive thermal analysis of materials in very short time
- Analysis of very small sample amounts
- Direct measurement of fast crystallization processes
- Determination of the reaction kinetics of fast reactions
- Investigation of the mechanism of additives under near-production conditions
- Determination of data for simulation calculations

Cost: This half-day event is free to attend and sponsored by METTLER TOLEDO. Continental Breakfast or refreshments will be included.

[To view the seminar agenda and to register, click here](#)

[Click here for the latest information on Flash DSC 1](#)

PUBLICATIONS

NEW

Journals

Amouroux, S. C., D. Heider, and J. W. Gillespie, Jr., "Characterization of Membranes used in Pressure Driven Composite Processing," *Composites: Part A-Applied Science and Manufacturing*, 41 (2), pp. 207-214, February 2010.

Amouroux-Berthe, S., D. Heider, and J. W. Gillespie, Jr., "Permeability Estimation of Nano-Porous Membranes for Non-Wetting Fluids," *Journal of Porous Media*, 13 (4), pp. 319-329, 2010.

Chandrasekaran V. C. S, S. G. Advani, and M. H. Santare, "Role of Processing on Interlaminar Shear Strength Enhancement of Epoxy/Glass fiber/Multiwalled Carbon Nanotube Hybrid Composites," *Carbon*, 48 (13), pp. 3692-99, 2010.

Chatterjee, A. and J. W. Gillespie, Jr., "Room Temperature Curable VARTM Epoxy Resins: Promising Alternative to Vinyl Ester Resins," *Journal of Applied Polymer Science*, doi: 10.1002/app.307402009. 2009, 115 (2), pp. 665-673, January 2010.

PUBLICATIONS

NEW

Kusoglu, A., M. H. Santare, A. M. Karlsson, S. Cleghorn, and W. B. Johnson, "Numerical Investigation of Mechanical Durability in Polymer Electrolyte Membrane Fuel Cells," *Journal of the Electrochemical Society*, 157 (5), p. B705-13, 2010.

Lim, A., S. L. Lopatnikov, N. J. Wagner, and J. W. Gillespie, Jr., "Investigating the Transient Response of a Shear Thickening Fluid Using the Split Hopkinson Pressure Bar Technique," *Rheologica Acta*, DOI 10.1007/s00397-010-0463-8.s, 49 (8), pp. 879-890, August 2010.

Nilakantan, G., M. Keefe, T. A. Bogetti, and J. W. Gillespie, Jr., "Multiscale Modeling of the Impact of Textile Fabrics Based on Hybrid Element Analysis," *International Journal of Impact Engineering*, <http://dx.doi.org/10.1016/j.ijimpeng.2010.04.007>, 37 (10), pp. 1056-1071, October 2010.

Stanzione III, J. F. and R. P. Wool, "Observing the Twinkling Fractal Nature of the Glass Transition," *J. Non-Cryst. Solids*, doi:10.1016/j.jnoncrysol.2010.06.041, 2010.

Conferences

Qiu, L., K. W. Goossen, D. Heider, D. J. O'Brien, and E. D. Wetzel, "Conical Couplers for Non-Pigtailed, Free-Space Optical Coupling to Fiber Optical Sensors for Bridge Monitoring," Fifth International Conference on Bridge Maintenance, Safety and Management, Philadelphia, PA, July 13, 2010. \

Qiu, L., K. W. Goossen, D. Heider, D. J. O'Brien, and E. D. Wetzel, "Free Space Optical Coupling to Completely Embedded Fiber Bragg Grating Sensors," SPIE Optical Engineering + Applications Conference, San Diego, CA, August 2, 2010 .

*Celebrating 35 years of
significant
contributions to
composites science and
technology, the
education of students,
and the creation and
transfer of technology to
industry.*

This is a newsletter publication of the University of Delaware Center for Composite Materials
Please visit us on the web at <http://www.ccm.udel.edu>

201 Composites Manufacturing Science Laboratory • phone 302.831.8149
University of Delaware, Newark, Delaware 19716-3144 • fax 302.831.8525

