

Photos by Dawn Marie Fiore



TOP STORY

STRONG TRADITION OF UNDERGRADUATE RESEARCH AT CCM CONTINUES

Researchers from all fields of science and engineering have become increasingly aware of how important it is to tell short, clear stories about their work.

University of Delaware
Center for Composite Materials

COMPOSITES

UPDATE

August 2012

Students at the University of Delaware Center for Composite Materials got plenty of practice in the art of the “elevator speech” on August 10, when they participated in the Center’s annual undergraduate research symposium.

At the event, many of the 50+ students who worked in CCM’s labs over the summer presented posters and delivered one-slide/two-minute summaries of their work to an audience of faculty, graduate students, staff researchers, and representatives from industry. Projects addressed subjects ranging from carbon nanotubes to designs for composite orthotics. One research team worked on a “warrior web,” which takes advantage of composite properties to transfer strain from the back to the hips when soldiers jump with heavy packs.

The presentations were organized into three sessions: (1) materials, processing, and characterization; (2) mechanical and impact properties; and (3) nanocomposites. After each session, the presenters invited the audience to learn more about their work at a poster session during the break.



TOP STORY (Continued)



*1st Place Winner,
Devin Prate*

“This approach limited the number of posters displayed at any one time to just a dozen or so from an individual session, allowing participants to spend more time viewing each one,” says CCM associate director Suresh Advani, who chaired the symposium. “It also gave the presenters a chance to look at posters from other sessions. We found this resulted in a lot of interaction.”

Another strategy that added to the dialogue was Advani’s advice to the presenters to give just enough information to pique people’s interest and encourage them to ask questions at the poster session.

“I told them to think of it like a movie trailer,” he says.

The symposium gives undergraduate researchers the chance not only to present their own work but also to learn about what others are doing and get a better idea of the “big picture” in CCM’s Composites Manufacturing Science Laboratory.

“They often get ideas for their own projects by talking with others,” Advani points out.

Awards were given based on audience evaluations. The following three students received prizes for their work:

- **First place: Devin Prate**, Title: *Fabrication and Characterization of Graphene-Based Polycarbonate Nanocomposites*
- **Second place: Maxime Leblanc**, Title: *Void Morphology and Transport Through Thermoset Prepregs*
- **Third place: Joel Monza**, Title: *Warrior Web—Variable Stiffness Load Bearing Segments*

First-prize winner Prate says that his research has been “an incredible experience” that has given him exposure to real-world engineering and has enabled him to be a part of the development of potentially cutting-edge technologies.

“The symposium offers a unique experience for undergraduate researchers in which they can share their work in a professional environment that is not all that different from what they can expect in their careers in the future,” he says.

Article by Diane Kukich

*2nd Place Winner,
Maxime Leblanc*



*3rd Place Winner,
Joel Monza*

[Click Here
to view photos
of the event](#)

OTHER NEWS

*UD-SAMPE Receives Kudos for Camp*

Engineers don't get a lot of fan mail, so it's understandable that Ray McCauley, President of the University of Delaware SAMPE Chapter, was "really excited" when he received a letter from middle school student Lara Smith thanking him and his fellow CCM grad students for providing her with a great experience at a recent Delaware Aerospace Academy summer camp.

Smith, who attended the 2012 Destination Moon camp held at the University of Delaware from July 8 – 13, wrote, "I learned a lot about the technology that would be required to travel to the moon and how to build my own lunar settlement."

Through SAMPE, CCM students offer students in both the Delaware Space Academy and Engineering Cool Stuff camps offered on the UD campus each summer. According to McCauley, both of the camps follow a similar formula, but the space academy has a design challenge.

"First, we talk about what composites are and why we study them," he says. "This includes passing around fun samples and seeing videos of things being made and tested. After that, we give a tour of CCM as well as a tensile test demo, which is a live test of a composite sample that fails around 6000 pounds just to stir up some excitement."

"Once this orientation is completed, we give them the rules for the space beam competition, so they can plan overnight. The next day, we come for a visit and help them fabricate their own composite and mixed material beams for flexural testing. We test these and videotape them before reporting the results. The winning beam this year held 6,934 pounds before failing!"



OTHER NEWS

(Continued)

The excitement factor obviously impressed young Lara Smith.

“When we toured your facility,” she wrote, “the demonstration of testing the strength of a carbon fiber material was quite interesting. Everyone was startled when the sample broke suddenly. Later, my jaw fell open in surprise when we found out my wing won the space beam testing competition.”

CCM director Jack Gillespie wasn’t surprised that McCauley and the other SAMPE members came up big in the eyes of a child.

“Our students do an outstanding job with these camps every year,” he says. “They understand the importance of engaging young people in a hands-on way in order to make engineering interesting to them, which is critical in attracting a new generation of students to this career path.”

Article by Diane Kukich



About SAMPE

The Society for the Advancement of Material and Process Engineering (SAMPE), an international professional member society, provides information on new materials and processing technology via technical forums, journal publications, and books. As the only technical society encompassing all fields of endeavor in materials and processes, SAMPE provides a unique and valuable forum for scientists, engineers, and academicians.



First installation of the Cool Stuff Camp during the tensile demonstration, led by CCM grad student Ray McCauley

OTHER NEWS

(Continued)

UD/RDECOM Meeting Held

The two-year-old partnership between the University of Delaware and the Army's Research, Development and Engineering Command (RDECOM) is expanding and yielding results.

On July 3, Army representatives met with select faculty at UD. Also at the meeting were U.S. Senator Tom Carper, UD President Patrick Harker, and David Weir, Director of UD's Office of Economic Innovation and Partnership, who is leading the partnership.

The meeting, which reaffirmed the growing partnership, was covered by military news sites. The articles mention CCM's role in advanced materials research, including a project focused on the development of advanced antennas that would replace inefficient, outmoded whip antennas on military vehicles. Also highlighted are new engineering curricula developed by CCM affiliated faculty at UD that allow interested students to tailor their studies with an eye toward future employment at Aberdeen.

<http://www.armytimes.com/news/2012/07/gannett-army-engineering-partnership-university-of-delaware-bonds-070912/>

http://www.army.mil/article/83199/RDECOM_University_of_Delaware_develop_research_education_partnerships/

UDaily

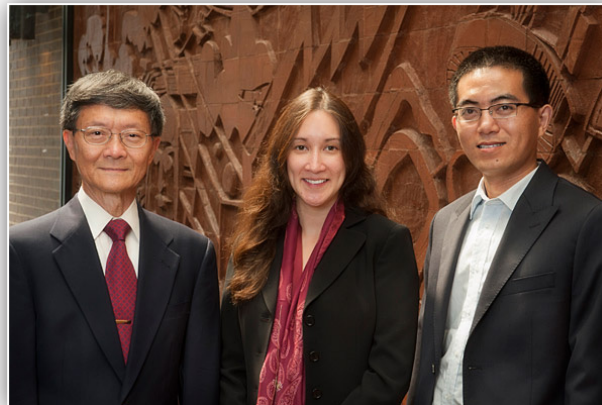
UD researchers report progress in development of carbon nanotube-based continuous fibers

9:30 a.m., July 23, 2012--The Chou research group in the University of Delaware's College of Engineering recently reported on advances in carbon nanotube-based continuous fibers with invited articles in Advanced Materials and Materials Today, two high impact scientific journals.

According to Tsu-Wei Chou, Pierre S. du Pont Chair of Engineering, who co-authored the articles with colleagues Weibang Lu and Amanda Wu, there has been a concerted scientific effort over the last decade to "go big" – to translate the superb physical and mechanical properties of nanoscale carbon nanotubes to the macroscale.

[Click here to read the entire story in UDaily.](#)

Photo by Kathy F. Atkinson



From left, Tsu-Wei Chou, Amanda Wu and Weibang Lu in Spencer Laboratory

OTHER NEWS

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OTHER NEWS

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UD's Norman J.
Wagner

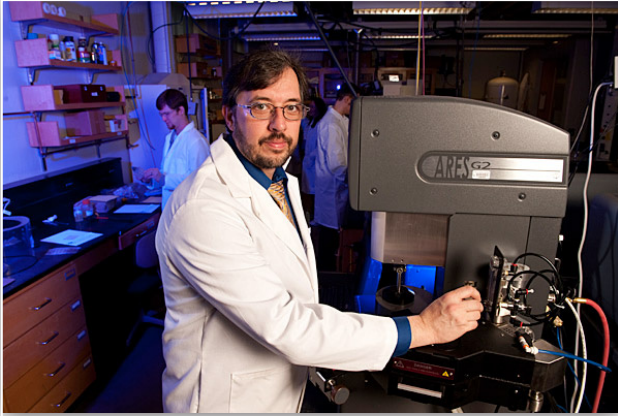


Photo by Evan Krape

UD engineers develop new instrumentation to study a fluid's microstructure

2:52 p.m., July 13, 2012--A team of researchers from the University of Delaware and two national laboratories have developed a new scientific instrument capable of studying the microstructure of complex fluids, polymers, nanomaterials and surfactant solutions using neutron scattering techniques.

The advance adds the ability for researchers to study time-dependent deformations (instances where fluids or solutions distort or change shape over time), a capability not previously available.

The work is a collaborative effort between UD's Center for Neutron Science and two of the world's premier neutron scattering facilities: the National Center for Neutron Research at the National Institute of Standards and Technology (NIST) in Gaithersburg, Md., and the Institut Laue-Langevin in Grenoble, France.

According to Norman Wagner, Alvin B. and Julia O. Stiles Professor of Chemical and Biomolecular

Engineering (CBE) at UD and director of UD's Center for Neutron Science, studying time-dependent deformations provides engineers and scientists new ways to understand materials. It is also a valuable tool for studying how nanomaterials can be self-assembled into useful and highly organized structures.

"The instrument can be used to develop structure-property relationships for a broad range of materials useful for foods, consumer products such as sunscreens, shampoos, detergents, as well as creating new, highly ordered nanocomposites and complex fluids of critical importance for natural gas and oil production," Wagner explains.

[Click here to read the entire story in UDaily.](#)

NEW PUBLICATIONS

Journals

Chowdhury, S. C., B. Z. (Gama) Haque, J. W. Gillespie, Jr., D. R. Hartman, "Molecular Simulations of Pristine and Defective Carbon Nanotubes under Monotonic and Combined Loading," Computational Materials Science, doi.org/10.1016/j.commatsci.2012.07.007, 65, pp. 133-143, 2012.

<http://www.sciencedirect.com/science/article/pii/S0927025612004193>

Cromer, K., J. W. Gillespie, Jr., and M. Keefe, "Effect of Multiple Non-Coincident Impacts on Residual Properties of Glass/Epoxy Laminates," Journal of Reinforced Plastics and Composites, doi: 10.1177/0731684412448221, 31, p. 815, 2012. <http://jrp.sagepub.com/content/31/12/815>

Jang, J-S, B. Bouveret, J. Suhr, and R. F. Gibson, "Combined Numerical/Experimental Investigation of Particle Diameter and Interphase Effects on Coefficient of Thermal Expansion and Young's Modulus of SiO₂/Epoxy Nanocomposites", Polymer Composites, 33 (8), pp. 1415-1423, 2012. <http://onlinelibrary.wiley.com/doi/10.1002/pc.22268/pdf>

Suhr, J. and J. Sargianis, "Core Material Effect on Wave Number and Vibrational Damp Characteristics in Carbon Fiber Sandwich Composites," Composites Science and Technology, 72 (13), pp. 1493-1499, 2012.

<http://www.sciencedirect.com/science/article/pii/S026635381200259X>

Wu, A. S., X. Nie, W. Chen, T-W Chou, D. Lashmore, M. Schauer, E. Tolle, and J. Rioux, "Carbon Nanotube Fibers as Torsion Sensors," Applied Physics Letters 100:201908, 2012.

http://apl.aip.org/resource/1/applab/v100/i20/p201908_s1

Wu, A. S., X., Nie, M. C. Hudspeth, W. W. Chen, T-W. Chou, D. Lashmore, M. Schauer, E. Tolle, and J. Rioux, "Strain Rate-Dependent Tensile Properties and Dynamic Electromechanical Response of Carbon Nanotube Fibers," Carbon, 50 (10), pp. 3876-3881, 2012.

<http://www.sciencedirect.com/science/article/pii/S0008622312003454>

Conferences

Yu, H., M. Noll, S. Schneiders, D. Heider, and S. Advani, "Through Thickness Thermal Conductivity Enhancement for 3-D Fiber Composite, SAMPE 2012, Baltimore, MD, May 21-24, 2012.

MEMBER NEWS

We would like to thank [Alliant Techsystems Inc.](#), Rocket Center, WV, for the recent renewal of their consortium membership.

To learn more about the benefits of becoming a member, please visit us on the web at www.ccm.udel.edu/Consortium/benefits.html



Celebrating 38 years of significant contributions to composites science and technology, the education of students, and the creation and transfer of technology to industry.

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