

# UPDATE

January 2010

**Dr. Vlachos** is currently involved in two major projects in conjunction with the Center for Composite Materials and Army Research Lab-one addressing fabrication and testing of lightweight catalytic micropower generators and the other focused on chemical erosion of silicon nitride.

Vlachos said the designation as a fellow of AAAS, which requires a nomination from his peers and recommendation by current members, was bestowed upon him mainly for his work in multiscale modeling and application to development, design, and elucidation of catalytic reaction mechanisms, nanotechnological processes, and signaling pathways in cancer.

"It's one of the most prestigious societies for us science folks," Vlachos said. "I'm flattered and honored to have received the fellowship. It gives members the opportunity to participate in the society and its benefits."

The goal of Vlachos's project fabrication and testing of lightweight catalytic micropower generators is to make portable electronics for soldiers.



Top Story

Professor Vlachos accepts prestigious  
award from



*Photos courtesy of UDaily*

Dr. Dion Vlachos, Elizabeth Inez Kelley Professor of Chemical Engineering at the University of Delaware, was named a fellow of the American Association for the Advancement of Science in December, and will accept the award at a ceremony in San Diego later in February of this year.

TOP STORY (Continued)

“What we’re finding is that the batteries soldiers carry in the field are too heavy and don’t last long enough,” Vlachos said. “Going on 72-hour missions with 70 pounds worth of batteries is not very efficient, so we’re trying to convert the energy they need from chemicals to electricity for longer missions without using the batteries.”

His second project, chemical erosion of silicon nitride, focuses on the erosion of certain materials used for parts in weapons. Vlachos said his team is carrying out various computations “to figure out the reason for the failure and erosion of certain materials in guns,” to prevent the cracking of those parts and provide a longer shelf life for the weapons.

Dr. Vlachos, who earned his doctorate at the University of Minnesota, has been a member of the UD faculty since 2000.

## OTHER NEWS

### CCM Congratulates Center's Newest PhD Recipient, Amanda S. Lim

Amanda S. Lim received her Ph.D. from the Materials Science and Engineering Department on her research titled ‘Implementing the Split Hopkinson Pressure Bar Technique for Complex Fluid Evaluation’. Her faculty advisor was Prof. John W. Gillespie, Jr. and her research was conducted through the UD Center for Composite Materials.

Dr. Lim completed her undergraduate degree from the University of Southern California in Mechanical Engineering and will continue on at the University of Delaware as a postdoctoral researcher working with Prof. Tsu-Wei Chou.



*PhD recipient Amanda Lim stands with her advisor, Prof. John W. Gillespie, Jr., and her family following the commencement ceremony*

## OTHER NEWS

**Upcoming Seminar****VIRTUAL TESTING OF COMPOSITES: From Materials to Components****Dr. Javier LLorca**

*Instituto Madrileño de Estudios Avanzados en Materiales (IMDEA-Materiales)  
& Departamento de Ciencia de Materiales, Universidad Politécnica de Madrid  
E. T. S. de Ingenieros de Caminos. 28040 - Madrid, Spain.*

**Friday, January 22nd at 11:00 and refreshments following**

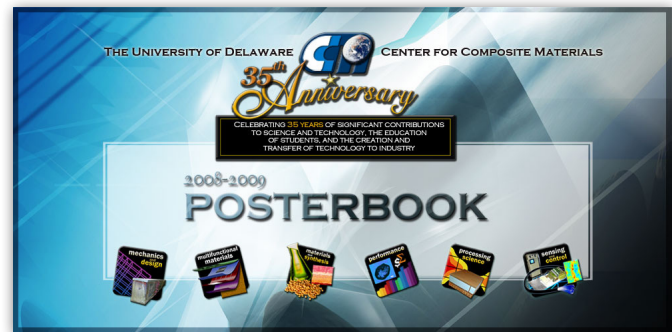
[Click here to view Seminar Abstract](#)

[Click here to view Prof. Javier LLorca Bio](#)

**Announcement****The 2008-2009 Posterbook is Now Available Online!**

This annual publication contains one and two-page posters on each of the projects within our core areas of research: Mechanics & Design, Multifunctional Materials, Materials & Synthesis, Performance, Processing Science and Sensing & Control.

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## CONSORTIUM MEMBER NEWS

We would like to thank **American GFM Corp., Chesapeake, VA** and **Nano Terra Inc, Cambridge, MA** for becoming our newest consortium members of 2010!

We also wish to thank **General Dynamics Land Systems, Sterling Height, MI** and **Materials Sciences Corp, Horsham, PA** for their recent renewal of their memberships, and for continuing to participate in consortium activities.

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



## NEW PUBLICATIONS

*Journals*

Chou, T-W., L. Gao, E. T. Thostenson, Z. Zhang, and J-H. Byun “An Assessment of the Science and Technology of Carbon Nanotube-Based Fibers and Composites,” *Composites Science and Technology*, 70 (1), pp. 1-19, 2010.

Gawandi, A., L. A. Carlsson, T. A. Bogetti, and J. W. Gillespie, Jr., “Mechanics of Discontinuous Ceramic Tile Core Sandwich Structure: Influence of Thermal and Interlaminar Stresses,” *Composite Structures*, doi:10.1016/j.compstruct.2009.07.022; 92, pp. 164-171, 2010.

Golt, M. C., S. Yarlagadda, and J. W. Gillespie, Jr., “Magnetic and Dielectric Properties of Composites Consisting of Oriented, Iron Flake Filler within a Thermoplastic Host: Part I. Material Fabrication and Electromagnetic Characterization,” *Journal of Thermoplastic Composite Materials*, 22 (6) pp. 551-567, 2009.

Golt, M. C., S. Yarlagadda, and J. W. Gillespie, Jr., “Magnetic and Dielectric Properties of Composites Consisting of Oriented, Iron Flake Filler within a Thermoplastic Host: Part II. Transport Model Review and Evaluation,” *Journal of Thermoplastic Composite Materials*, 22 (6) pp. 569-583, 2009.

Johnson, B. B., M. H. Santare, J. E. Novotny, and S. G. Advani, “Wear Behavior of Carbon Nanotube/High Density Polyethylene Composites,” *Mechanics of Materials*, 41 (10), pp. 1108-15, 2009.

Kalman, D. P. and N. J. Wagner, “Microstructure of Shear-Thickening Concentrated Suspensions Determined by Flow-USANS,” *Rheologica Acta*, 48 (8), pp. 897-908, 2009.

Kalman, D. P., R. L. Merrill, N. J. Wagner, and E. D. Wetzel, “Effect of Particle Hardness on the Penetration Behavior of Fabrics Intercalated with Dry Particles and Concentrated Particle-Fluid Suspensions, *ACS Applied Materials and Interfaces*, doi: 10.1021/am900516w, 1 (11), pp. 2602-2612, 2009.

Kusoglu, A., Santare, M. H., and Karlsson, A. M., “Mechanics-Based Model for Non-Affine Swelling in Perfluorosulfonic Acid (PFSA) Membranes,” *Polymer*, 50 (11), pp. 2481-91, 2009.



## NEW PUBLICATIONS

(Continued)

Lim, A. S., S. L. Lopatnikov, and J. W. Gillespie, Jr., "Development of the Split-Hopkinson Pressure Bar Technique for Viscous Fluid Characterization," *Polymer Testing*, 28 (8), pp. 891-900, December 2009.

Lopatnikov, S. L., B. A. Gama, T. A. Bogetti, and J. W. Gillespie, Jr., "Dynamics of a Rigid Plate Impacting a Glass Plate: A One Dimensional Analysis Considering Failure-Wave Propagation," *Journal of Applied Physics*, 106, 093521, 2009. 2009 American Institute of Physics. Doi: 10.1063/1.3245284.

Wang, X., Gazonas, G.A., and Santare, M.H., "On the Effective Electroelastic Properties of Microcracked Generally Anisotropic Solids," *International Journal of Fracture*, 158 (1), pp. 27-40, 2009.

Wang, X., Santare, M. H., and Gazonas, G.A., "Anisotropic Effective Moduli of Microcracked Materials Under Antiplane Loading," *Engineering Fracture Mechanics*, 76 (12), pp. 1910-19, 2009.

Xiao, J. R., J. Staniszewski, and J. W. Gillespie, Jr., "Tensile Behaviors of Graphene Sheets and Carbon Nanotubes with Multiple Stone-Wales Defects," *Materials Science and Engineering A*, 527 (3), pp. 715-723, 2010.

Yoon, M-K., H. Chen, P. Simacek, D. Heider, and J. W. Gillespie, Jr., "Modeling VARTM Processes with Hybrid Media Incorporating Gravity Effects," *Journal of Composite Materials*, 43 (24), pp. 2903-2920, 2009.

## Conferences

Abu Obaid, A., J. M. Deitzel, J. W. Gillespie Jr., and J. Q. Zheng, "The Effects of Environmental Conditioning on High Performance Aramid Fibers", The 24th Annual Technical Conference presented by the American Society for Composites and the Canadian Association for Composite Structures and Materials, University of Delaware, Sept. 15-17, 2009.

## NEW PUBLICATIONS

(Continued)

Kang, S-G., B. A. Gama, S. Yarlagadda, and J. W. Gillespie Jr., "Finite Element Modeling of Delamination in Thick-Section Composites Using LS-Dyna," The 24th Annual Technical Conference presented by the American Society for Composites and the Canadian Association for Composite Structures and Materials, University of Delaware, Sept. 15-17, 2009.

Keenan, C. D., J. W. Gillespie, Jr., D. Heider, R. Jensen, T. Bogetti, R. Adkinson, and J. D. Bender, "Process Capabilities for the Infusion of High Viscosity Polyurea Resin Systems for Composite Applications," The 24th Annual Technical Conference presented by the American Society for Composites and the Canadian Association for Composite Structures and Materials, University of Delaware, Sept. 15-17, 2009.

McAllister, Q. P., J. W. Gillespie, Jr., and J. R. VanLandingham, "Nanoindentation of High Performance Fibers," The 24th Annual Technical Conference presented by the American Society for Composites and the Canadian Association for Composite Structures and Materials, University of Delaware, Sept. 15-17, 2009.

Qiu, L., M. E. Teitelbaum, K. W. Goossen, D. Heider, D. J. O'Brien, and E. D. Wetzel, "Free Space Optical Coupling to Embedded Fiber Bragg Grating Sensors Through Panel Surfaces", The 24th Annual Technical Conference presented by the American Society for Composites and the Canadian Association for Composite Structures and Materials, University of Delaware, Sept. 15-17, 2009.

Kissounko, D. A., K. M. Danner, J. M. Deitzel, J. W. Gillespie Jr. "Synthesis and Characterization of Electrospun Conductive Metal and Complex Metal Oxide Nanofibers," American Society of Mechanical Engineers 2009 International Congress, IMECE2009-12385, Orlando, FL, November 16-21, 2009.

*Celebrating 35 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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