



CCT Weekly August 21- August 27, 2011

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Hybrid Electronic Materials Studied for Energy/Aerospace Applications

Theda Daniels-Race, associate professor of the LSU Department of Electrical and Computer Engineering and the Center for Computation & Technology, has received \$30,000 from the Louisiana Board of Regents - NASA EPSCoR Program to investigate the electrical characteristics and environmental sensing capabilities of hybrid nanomaterials, or HNMs, as synthesized from ionic liquids or ILs.

Daniels-Race's proposal titled "Hybrid Electronic Materials for Energy/Aerospace Applications" was funded for a one year period and conceives that the electrical and physiochemical properties of IL-HNMs are indicative of their utility in energy (e.g. fuel cells, solar) and aerospace (e.g. atmospheric sensing) applications.

Motivated by the recent discovery and development of a new form of nanoparticle by Isiah M. Warner of the LSU Department of Chemistry—synthesized frozen ILs in nanoparticle form—this study of IL-HNMs will represent a first-time investigation of the utility of these nanoparticles for electrochemical energy storage and environmental sensing as it relates to aerospace applications.

"Preliminary results indicate that the IL-HNMs are potential candidates for the improvement of existing solar cells by replacing indium tin oxide (ITO), a transparent, highly conductive material used in dye sensitive solar cells (DSSCs)," said Daniels-Race. "ITO films are brittle and subject to device contact problems—they are also expensive. Conductive polymer alternatives to ITO degrade over time. Other alternatives to ITO include cadmium sulfide and cadmium selenide quantum dots. These work well for their emission spectra tunability but are damaging to the environment. The cation-anion pairings of IL-HNMs provide a better, greener level of power, without the cost of ITOs and the dangers of cadmium."

The Warner Group IL-HNMs have been used in the detection of six different VOCs (volatile organic compounds). "This finding opens the door to not only a facile and affordable means of molecular weight determination but also to explosives detection, chemical weapons detection and discrimination, and biological species detection," said Daniels-Race.

Directly benefiting present and next-generation energy and environmental needs of vehicles for both air and space (and conceivably land transportation as well), the potential research findings of the IL-HNMs open up opportunities to improve and newly engineer devices (e.g. solar cells, chemical sensors) whose energy and environmental applications are critical to the advancement of NASA goals with respect to aeronautics research.

For more information on this research, please visit: <http://www.cct.lsu.edu/home>.

Lectures this week:

Tuesday –

There will be a Computational Mathematics Seminar Series lecture on "[Higher Order Estimates in Time for the Arbitrary Lagrangian Eulerian Formulation in Moving Domains](#)" by Andrea Bonito, Texas A&M University. The lecture will take place Tuesday, August 23 at 3:30 PM in 338 Johnston Hall.

Pats on the back:

- Thomas Sterling and Maciej Brodowicz received an award from NSF titled "Dynamic Data Path Management for Asynchronous Vertical Storage Hierarchy." The award is for \$299,998 for two years.
- Brygg Ullmer, Susanne Brenner, Mark Batzer, Les Butler, and Rod Parker received an award from NSF titled "MRI: Development of Melete: an interaction-oriented, software-rich compute cluster with tangible interface support for collaborative research and the classroom." The award is for \$900,000 for four years.
- Hartmut Kaiser and Thomas Sterling received an award from NSF titled "CSR: Small: Accelerated ParallelX (APX) for Enhanced Scaling AMR based Science." The award is for \$424,911 for three years.
- The third edition of "The Mathematical Theory of Finite Element Methods" by Susanne C. Brenner and L. Ridgway Scott (Springer Verlag, 2008) has been reprinted by the World Publishing Corporation, Beijing, China.
- Thank you to everyone involved in the Proven Algorithmic Techniques for Many-core Processors workshop last week!

CCT in the news:

LSU Professor Selected to Deliver Prestigious Kovalevsky Lecture in Canada

Source: [LSU Office of Communications and University Relations](#)

Please Note:

- The University will be closed on Monday, September 5th in observance of Labor Day.
- The 2011 HPC User Satisfaction Survey is open for comment until August 31st. Anyone who uses high performance computing resources at LSU or LONI is invited to take a few minutes to complete the survey: http://www.hpc.lsu.edu/survey/public/survey.php?name=hpc_at_lsu_user_2011. Please help us understand your needs and future requirements.
- Prior approval is required for Special Meal Requests. Employees who make meal purchases without prior approvals may find that they must cover the cost of any monies spent for an unapproved event out of pocket. Dine-in restaurant meals are not allowed on LaCarte credit cards. Please contact Susie McGlone (susie@cct.lsu.edu) prior to any special meal with visitor(s) to file the appropriate request for approval. Prior approval could take up to two weeks, so please plan accordingly.
- Please remember to send your news concerning grants, awards, conferences, or other pertinent information to CCT Event Coordinator Jennifer Fontenot at jennifer@cct.lsu.edu

- Follow CCT with social media to access photos and see news, events or updated information. These pages are public; you do not need an account to view the information.

- o [Facebook group](#) : LSU Center for Computation & Technology
- o [Twitter](#) : LSUCCT
- o [YouTube channel](#) : LSUCCT

Upcoming Grant Deadlines:

Note: Please check the [CCT deadline Web site](#), since it is updated daily.

[Computer and Network Systems \(CNS\): Core Programs](#)

September 15, 2011 10:00 am

At Most \$ 3,000,000.00 available

[Information and Intelligent Systems \(IIS\): Core Programs](#)

September 15, 2011 10:00 am

At Most \$ 3,000,000.00 available

[Computing and Communication Foundations \(CCF\): Core Programs](#)

September 15, 2011 10:00 am

At Most \$ 3,000,000.00 available

[Partnerships for International Research and Education \(PIRE\)](#)

October 19, 2011 10:00 am

At Most \$ 4,000,000.00 available

[Sustainability Research Networks Competition \(SRN\)](#)

December 1, 2011 10:00 am

At Most \$ 12,000,000.00 available

Publish Date:

08-23-2011

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