



## LA Scientist on State of Matter Discovery Team

The August 21, 2008 announcement of the discovery of a new state of matter lying between magnet and silicon hailed broad implications for the field of science and technological advances.

The international team of scientists that made the discovery included Dr. John DiTusa, a Louisiana State University (LSU) Professor of Physics and Astronomy. The announcement was made in the international weekly journal, *Nature*.

“While the discovery is a fundamental one, it also has technical implications,” says Dr. DiTusa. “It suggests new ways to control the current and magnetism of a semi-conducting material, control that is necessary for designing new ways to increase speed and information storage capacity of computers.”

The discovery, he notes, was “the result of combining ferromagnetic iron with semiconductor silicon and adding a small amount of manganese to create a new material, one that is not a semiconductor, but not a magnet, either.”

Ferromagnetism is the form of magnetism encountered in everyday life—as in refrigerator magnets—and silicon is the second most abundant element, after



Dr. John DiTusa, LSU Professor of Physics and Astronomy, right, and Dr. David Young, Associate Professor of Physics, in an LSU lab with a refrigerator capable of cooling to hundredths of a degree above absolute zero.

LA EPSCoR LINK awards funding to science and engineering faculty, post-doctoral researchers, graduate and undergraduate students to build partnerships with national laboratories, research centers and the private sector. For details, go to [www.laregents.org](http://www.laregents.org).

oxygen, in the crust of the earth. “It’s amazing that something that thus far was thought to be in the realm of mathematical physics could be found in an alloy formed by simply melting together a few common elements,” says Dr. DiTusa.

Prior to the discovery announcement, Dr.

DiTusa was awarded a LA EPSCoR LINK (Links with Industry, Research Centers, and National Labs) grant to facilitate science and engineering research, education and training opportunities for faculty, post-doctoral researchers and graduate and undergraduate students.

Dr. DiTusa is using his LINK award to spend six weeks (September 15, 2008 - January 15, 2009) expanding the international research project at the Oak Ridge National Laboratories (ORNL). He is employing ORNL’s world class neutron facilities in his exploration of how magnetic materials can be manipulated with the same control as present day electronic materials based on silicon technology.

“The LINK program has been indispensable to this research as it has provided funds for me to travel to a couple of the world’s most intense neutron sources, the Oak Ridge National Laboratory’s High Flux Isotope Reactor (HFIR) and Spallation Neutron Source (SNS). The length of the visit also provides me with an opportunity to work with, and learn from, some of the world’s experts,” says Dr. DiTusa. “Thus far, it has been a fantastic experience that will benefit my research program for years to come.”

## Pfunding Landscapes and Coastal Waters

*Louisiana EPSCoR’s Pfund provides seed money to stimulate science and engineering faculty in their exploration of innovative or novel research. Untenured faculty may use funding to sharpen their research focus and develop cutting-edge techniques; tenured faculty, to demonstrate a novel or innovative concept or investigate new areas requiring a shift in their current research. Highlights of two grants follow.*

### Dr. Yan Chen

Pest management in urban landscapes presents unique challenges because of the tremendous diversity of ornamental plants, each with its own complement of insect pests. As a result, pesticides are applied on a calendar rather than an “as needed” basis, causing unnecessary pesticide use and increased environmental risks.

A Pfund grant to establish a plant phe-

nology research system focusing on alternative pest monitoring approaches was awarded to Dr. Yan Chen, Assistant Professor of Horticulture Science at LSU Agricultural Center’s Hammond Research Station.

Plant phenology, the study of the annual cycles of plant development and how these cycles respond to seasonal changes in the environment, is used as a tool to

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Left photo, Dr. Yan Chen, right, discusses the flowering stage of a bottle bush flower with Dr. Regina Bracy, Hammond Research Station Resident Coordinator. Right, Dr. Eurico D'Sa conducts Bering Sea optical measurements under a NASA/Bigelow Lab grant resulting from his Pfund research.

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predict pest activities in nurseries and landscapes.

“Because the development of plants and insects is temperature-dependent, plants can be used to accurately track environmental factors that affect insect activities, a correlation that can also be used in predicting pest activities,” says Dr. Chen. “It is especially useful for pests that are difficult to detect or have narrow control windows, such as the azalea lace bug and wax scales.” She adds that while success stories have been reported from northern states, data linking phenology and insect activity in the south are lacking.

The Hammond Research Station’s phenology research system includes 35 woody flowering species. It was the first step toward a multi-state phenology network among southern states using ornamental plants to forecast urban landscape pest

activities and guide pest management tactics. Participants include university researchers from Mississippi, Florida, Georgia, Tennessee, Alabama and Louisiana. A Bio-calendar for more efficient pest control is being developed and the site is being used for research, education and training, and community outreach.

**Dr. Eurico D'Sa**

Dissolved organic matter (DOM) plays an important role in oceanic biogeochemistry and climate changes and is an indicator of water quality in coastal water, especially those dominated by large rivers. In coastal waters similar to Louisiana's, DOM inputs contribute significantly to carbon fluxes.

An important fraction of DOM is its colored component, CDOM. One of the least studied seawater constituents along the Louisiana coast, CDOM was the focus of a Pfund project led by Dr. Eurico D'Sa, Assistant Professor, LSU Coastal Studies

Institute & Department of Oceanography and Coastal Sciences.

Goals of this Pfund project are: 1) to analyze a large data set of CDOM spectral absorption in relation to physical and biological properties, salinity and chlorophyll concentration; 2) to study CDOM dynamics using a combination of satellite-derived and field measured CDOM absorption along the Louisiana coast.

Besides contributing to a better understanding of CDOM distribution along the coast, the research also resulted in a \$286,382 grant from NASA/Bigelow Laboratory for Ocean Sciences and presentations at the 2007 American Geophysical Union Joint Assembly in Acapulco and the 2008 AGU Ocean Sciences Meeting in Orlando.

“My participation in the LA EPSCoR Pfund program has also enhanced the development of my LSU research program,” adds Dr. D'Sa.

