Evidently, the work at the NanoScience Technology Center has received attention across the campus of the University of Central Florida. We are pleased to acknowledge two outstanding awards, one to a faculty member and the other to a graduate student.

First, our Interim Director, Dr. Debra Reinhart has earned UCF’s top faculty honor by being named Pegasus Professor for her devoted service to the University and its students and her notable accomplishments in the field of Environmental Engineering. Since 2000, only a handful of professors have received the Pegasus Professor Award which recognizes sustained excellence in teaching, research, and service. As a Pegasus Professor, Dr. Reinhart received a statue of the UCF Pegasus, a gold Pegasus Professor Medallion and a cash award of $5,000. In addition to her many duties as NSTC’s Director and faculty mentor, Dr. Reinhart is also Interim Assistant Vice President for Research and a full professor in the College of Engineering and Computer Science.

Furthermore, one of our graduate students, Satyender Goel (NSTC & Chemistry) was selected for the Order of Pegasus. This is the most prestigious student award bestowed by the University of Central Florida. Graduate students are selected based on their academic achievement, professional/community service, leadership, and publication and/or research experience. We congratulate Satyender on this significant accomplishment. Note that in addition to his many duties, Satyender was the student leader for the highly successful NanoFlorida 2008 event. See page 5 for more information about Satyender.
Thank you for taking the time to read the Spring 2009 edition of UCF’s NanoNews. The faculty, students, and staff of the NSTC continue to contribute to the success of the Center through their hard work and wonderful enthusiasm. That’s what makes coming to work each day so pleasurable. I recently completed our 2008 Annual Report and was impressed with what this young center has achieved. I’d like to share some of the metrics and accomplishments with you.

In 2008, some 26 undergraduates were engaged in interdisciplinary research at the NSTC; their primary departments were Electrical Engineering & Computer Science (EECS), Chemistry, Physics, and Biomedical Sciences (BMS). NSTC faculty members advised and supervised 47 doctoral and 3 MS students from EECS, BMS, Mechanical, Materials and Aerospace Engineering (MMAE), Physics, and Chemistry. NSTC faculty members taught over 1000 undergraduate students for the Departments of Chemistry, Physics, EECS, MMAE, and BMS. In addition, graduate courses were taught last year to 100 students. The Center supported 23 postdoctoral research associates. The NanoScience Student Body Association was created in 2008.

The funding secured to support interdisciplinary research projects by NSTC faculty in 2008 totaled $4.5 million. NSTC faculty members received three NSF CAREER Awards, a DARPA Young Faculty award, and a R01 from the NIH's National Institute of General Sciences. The NSTC faculty produced 10 book chapters, presented 37 invited talks and 31 contributed talks, published 89 papers in national and international journals (63 published, 20 in press and six accepted), and attended 32 national and international conferences. As a result of their active research program, NSTC faculty had 16 patent applications and eight disclosures. NSTC faculty and students received prestigious awards, journal features, and other recognitions which you have read about in past NanoNews editions.

We are a collaborative Center and have reached out to partners both within and outside of UCF. For example, the inaugural NanoFlorida 2008 attracted over 200 individuals with over 100 submitted posters and talks from universities across the state. NanoNews was initiated and three 2008 issues were sent electronically to 1000s of recipients. NSTC sponsored a seminar series with 21 internationally recognized speakers. An Industrial Affiliates Program was created and we welcomed our first members including Siemens, VaxDesign, and Sciperio. We also made joint appointments to four UCF faculty members from Mathematics, Florida Solar Energy Center, Physics, and MMAE. Two NanoDays were held in 2008 opening the Center with between 150 and 200 attendees who were given tours and demonstrations.

As you can see 2008 was a very busy year. And 2009 is shaping up to an even busier and more successful year. Enjoy our Spring 2009 NanoNews!

Dr. Debra R. Reinhart, Ph.D., PE

Nano Research Expo Day was held April 3, 2009. 150-200 visitors attended this event making it a great success. NSTC students and staff performed an excellent job of organizing tours and describing new discoveries in the world of nano. See selected pictures below from the event tours.

From L to R: NSTC students Mohammad Arif, Anupama Natarajan, Max Bonner, Andrew Tablum demonstrated research conducted at the NSTC laboratories and its state-of-the-art facilities.

Nano/Materials Affiliates Program

Please consider becoming one of the founding members of UCF’s Nano/Materials Industrial Affiliates Program. This program has been created to meet the needs of your company and to provide our faculty members with an interface with the commercial world.

The NanoScience Technology Center has over 20 faculty members, in 2008 we received three prestigious NSF CAREER awards and one DARPA Young Faculty Award. We seek to leverage our core state line funding of over $4M annually into exciting research findings and commercializable IP.

Founding membership costs are a modest $1k/yr. Feel free to call us at 407 882-1578 or email us at nano@mail.ucf.edu if you are interested in joining our affiliates program or if we can answer any questions about this program.

See http://www.nanoscience.ucf.edu/industry for more information.
Dr. Lei Zhai has been leading our Green Energy efforts and we thought it appropriate to highlight his work in this context. Lei is an Assistant Professor at the NanoScience Technology Center and the Department of Chemistry. Lei completed his Ph.D. at Carnegie Mellon with Dr. Richard McCullough and a post-doctoral fellowship at MIT under the mentorship of Professors Michael Rubner and Robert Cohen. Lei is originally from China and completed a B.S. in Chemical Engineering at the East China University of Science & Technology. Lei has always had a fascination with the chemical composition of matter which is clearly evident across the spectrum of projects he has pursued. He has over 26 peer-reviewed publications, has been named in 4 patents, and in addition to other NSF and US Army funding, has received the prestigious NSF Career Award in 2008.

Our interdisciplinary center is an ideal environment to explore energy-related projects. For instance, one challenge in the creation of highly efficient thin-film photovoltaic solar cells is the use of materials that are tailored for this application. Towards this goal, Lei, along with Dr. Qun Huo, also at the NSTC, has developed novel conductive block copolymer systems to disperse and stabilize carbon nanotubes (CNTs) in different solvent media and polymer matrices without disrupting the structure of CNTs (Figure 1). The conjugated polymer blocks such as polythiophenes can form strong p-p interactions with carbon nanotube walls, while the non-conjugated polymer blocks will provide the de-bundled CNTs with good solubility and stability in a wide range of organic solvents and host polymer matrices. Additionally, the functional non-conjugated blocks can introduce various functional groups on the CNT surface. A series of block copolymers including P3HT-b-PS, P3HT-b-PMMA have been utilized to fabricate CNT polymeric nanocomposites with unique mechanical and electrical properties. The conductive block copolymers not only provide a universal system to disperse carbon nanotubes but also introduce other interesting properties into the system. For example, a unique superhydrophobic and conductive nanocomposite thin film coating was fabricated through an extremely facile solution casting process using P3HT-b-PS/CNT systems. This approach can be applied to a variety of substrates extending from glass, silica wafers, gold, to aluminum foil, fabrics and papers. In addition to superhydrophobicity, the film also exhibits high electrical conductivity and excellent sensitivity for various gases without moisture interference. These properties, combined with the ease of fabrication and large surface area provided by the porous morphology, make the conductive block copolymer/CNT composites promising materials for many potential applications. These findings will help advance the creation of more efficient devices for a variety of applications. For instance, the targeted applications include: piezoelectric actuators and power generators using CNT/polyvinylidene difluoride composites, organic photovoltaics, sensors free of moisture interference, ultra-thin lithium ion batteries and supercapacitors and ultra-thin electromagnetic bandgap (EBG) absorbers. The research results have led to two papers in the Advanced Materials and one paper in Advanced Functional Materials. For more information about Lei see http://www.nano.ucf.edu/faculty/zhai.php

![Figure 1](image.png)

Figure 1. (a,b) Schematic illustration of dispersing CNTs by a conjugated block copolymer and the structure of P3HT-b-PS; c) HRTEM image of a single MWCNT covered by a thin layer of P3HT-b-PS; d) Magnified view of the honeycomb structure showing rrP3HT-b-PS-rich ridge and MWCNT-rich base; e) Fluorescence image of the honeycomb structure; f) A digital photo image of a 10 µL water droplet on superhydrophobic surface with a contact angle of 159.6°.
Congratulations to Sergio Tafur (above) who was elected to become the President of the Nano Student Body Association.

In addition to being a busy Ph.D. student in Theoretical Physics, Sergio Tafur has assumed the responsibilities of leading the large Nano Student Body Association at the NanoScience Technology Center. This large body of research-oriented students is composed of over 50 students.

Binh Tran, (above) receives Undergraduate Research Grant.

Binh, an Undergraduate student majoring in chemistry, has been awarded an undergraduate research grant from UCF Office of Undergraduate Research (OUR). This grant will support his project of "Synthesis of Conjugated Polymer/Silica Core-Shell Nanoparticles" at Dr. Lei Zhai’s Laboratory. Binh has also been selected for the UCF Research and Mentoring Program that provides $1,400 to support his research.

News from the Hybrid Systems Lab (Dr.J Hickman’s group)

3 students have passed their Ph.D. defense

- Mainak Das graduated in December 2008 and is a research associate in the Hybrid Systems Lab at the NSTC.
- Kerry Wilson will graduate in May 2009, and is in a postdoc position at the University College of London.
- Kucku Varghese will graduate in May 2009, she conducted her research at UCF, but will graduate from the Medical University of South Carolina. She is presently in a postdoc position at the University of Florida.

Dr. Hickman was elected to the Board of Directors for the American Institute for Medical and Biological Engineering (AIMBE)

Dr. Hickman’s note:

Previously, I was elected a Fellow to the American Institute for Medical and Biomedical Engineering that is the umbrella society that represents 17 different biomedical and bioengineering societies in Washington, DC and to the world. This was a great honor for me as the previously elected Fellows are on the Who’s Who list in the various National Academies. Recently, I was further honored by the members by being elected to the Board of Directors of this esteemed organization.

Nano Graduate Student Atul Asati (above) receives Graduate Research Excellence Award.

We are happy to announce that Dr. J. Manuel Perez's graduate student, Atul Asati is a proud recipient of an Eli Lilly Graduate Research Excellence Award from the American Association of Pharmaceutical Scientists (AAPS). This prestigious award will be presented at the AAPS National Biotechnology Conference in Seattle, WA in June 2009. He will present work on the creation of polymer coated ceria nanoparticles at the conference.

Papers


Satyender is pursuing a PhD in Chemistry conducting research at the NanoScience Technology Center at University of Central Florida (UCF).

He finished his Bachelor of Chemical Engineering at North Maharashtra University, Jalgaon, India, continued his studies and achieved a Master of Science - Cheminformatics in 2005 at the University of Manchester, U.K. Satyender has been honored a number of times including a 2009 Student Internship at Los Alamos National Laboratory, Los Alamos, New Mexico, USA, “Order of Pegasus” class of 2009, Graduate Student Excellence Award from ACS Chemical Computing Group at the 236th ACS National Meeting in Philadelphia – Aug 2008, Honorary mention at 4th Annual Meeting of Florida Society for and Materials Simulation May 2008.

Satyender has been actively involved in research, has published a number of articles and presented posters at annual meetings and conferences. Apart from research he is actively involved with computer programming and has knowledge of C/C++, Perl, Java, SQL, Fortran, Pascal. Operating systems—Linux, MS Windows 98, 2000, XP, Productivity Software-EndNote, MS Project, MS Access, other MS Office Tools, Scientific Tools used, Visualization-Accelrys ViewerLite 5.0, GuassView 03, Molden, ChemSketch 10.1, Molecular Dynamics-LAMMPS, AMBER 5.0, GULP 3.0, GROMACS & Electronic Structure-Gaussian 03, HyperChem 5.0, QChem 3.0.

Since 1997, Satyender has been a member of professional organizations such as the American Chemical Society (ACS), the American Physical Society (APS), Student Chapter of Physical Society (SPS), Materials Advantage (MA) Students Chapter, Consortium of American Ceramic Society, ASM International, the Minerals, Metals ad Materials Society (TMS), Students Chapter of Materials Research Society (MRS), Trained Auditor for ISO 9001: 2000: Quality Management Systems, and the Indian Society for Technical Education, ISTE.

Dr. J. Manuel Perez’s paper featured as cover article in Angewandte Chemie International and highlighted in Chemical and Engineering News (C&EN)

Congratulations to Dr. J. Manuel Perez and his group for their recent paper in Angewandte Chemie titled "Oxidase-like activity of polymer coated cerium oxide nanoparticles." Their findings can be used in a design of simpler and less expensive immunoassays to detect cancer cells and potentially bacteria. This work is featured in the Communication’s cover of the Journal and also in the Science and Technology Concentrate section of the February 16 edition of Chemical and Engineering News (C&EN). In this paper, the authors report the use of cerium oxide nanoparticles as versatile aqueous redox catalyst that can oxidize a series of compounds without the need of hydrogen peroxide.

Dr. Perez also Awarded NIH R01 Grant

Congratulations to Dr. J. Manuel Perez (joint Chemistry Department appointment) who also received an R01 from the National Institute of Health (NIH) titled "An integrated NMR/magnetic nanosensor system for detection of bacteria and toxins." R01s are a major milestone in biomedical research careers. This NIH/NIGMS project will provide funding of approximately $800,000 over four years to address this crucial topic. This project will address the crucial need for point-of-care, field-based analysis for water- and food-borne toxins and bacteria that cause diseases. Investigators at the University of Florida and the ARMY’s Edgewood Chemical and Biological Weapon Centers are collaborators in this NIH funded project.

Dr. Masunov Awarded NSF Collaborative Research Grant: Dr. Artem Masunov (Assistant Professor, Joint NSTC & Chemistry) is the Co-PI on a new $1.8 Million 4-Year Collaborative Research in Chemistry Grant from NSF titled Self-Organized Aggregates in Photonics (SOAP): A Comprehensive Approach to Multiphoton Absorbing Supramolecular Assemblies (PI: Dr. Kevin Belfield, Professor & Chair, Department of Chemistry).

Dr. Huo Awarded Chinese Oversea Young Investigator award: The award is divided into two stages: the first stage is 200K RMB for two years and the second stage of the award will be given upon approval by an internal renewal process at National Science Foundation of Chiana, with a total award amount of 800K RMB for four years. The title of this project is The Applications of Nanoparticles and Assemblies in Bioanalytical Chemistry.
**Goodbye and Best Wishes to our Founding Lab Manager, Paul Alman**

Paul has been essential to the creation of the NanoScience Technology Center. He helped in the buildout of our >6.5M three-phase facility. He will continue to work in Dr. J Hickman’s lab on a part-time basis.

**Our Associate Director, Dr. Jeffrey Anderson, is the new Assistant VP for Strategic Development at San Antonio.**

We wish Dr. Anderson all the best in his new position. Dr. Anderson worked at the center for the past two and a half years providing public outreach and the development of large research initiatives.

**Congratulations to Michael Broome, for his upcoming graduation.**

Michael, is the IT Coordinator for both NSTC & ORC will be graduating with a Bachelor of Science Business Administration degree.

**Nano Staff Profile: Diane Maldonado**

We are honored to have the service and personality of **Diane Maldonado** in our midst. As our Administrative Assistant, Diane constantly deals with the flow of money and materials within our multimillion dollar enterprise with charm, good wit, and persistence. It is not an easy job but she performs it with excellence and perpetual optimism. Diane is originally from Connecticut but has lived in Florida for 15 years and loves the Florida lifestyle. In fact she has worked at UCF for over 14 years, first in Mechanical Engineering, then the Rosen College of Hospitality, then moved on to the Student Development and Enrollment Services and now at NSTC for the past year and a half. Diane’s family originally came from Puerto Rico and she loves everything about Hispanic culture: Salsa dancing; spicy food; and speaking Spanish. Diane has two teenagers, ages 18 and 16 years who keep her very busy in addition to her heavy responsibilities at the NSTC. She is currently working on her A.S. in Business Administration at Valencia Community College and she says she enjoys the academic environment and the diversity of our center. She enjoys learning about different cultures and frequently reaches out to new students and faculty who come here from around the world.
Upcoming Nano Conferences

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<tr>
<th>Speaker</th>
<th>When</th>
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<tr>
<td>Dr. Michael L. Shuler - Cornell University</td>
<td>Thursday, Jan. 22, 2009, 4:00pm - 5:00pm</td>
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<tr>
<td>Dr. Jun Zhang - New York University</td>
<td>Friday, Feb. 20, 2009, 4:15pm - 5:15pm</td>
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<tr>
<td>Dr. Marek Urban, University of Southern Mississippi</td>
<td>Monday, February 16, 2009, 12:00pm - 1:00pm</td>
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<tr>
<td>Dr. Jerzy Leszczynski - Jackson St University</td>
<td>Monday, Feb. 23, 2009, 4:00pm - 5:00pm</td>
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<tr>
<td>Dr. Buddy D. Ratner - University of Washington</td>
<td>Tuesday, Feb. 24, 2009, 4:00pm - 5:00pm</td>
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<td>Dr. Thomas DeMarse - University of Florida</td>
<td>Tuesday, March 3, 2009, 3:00pm - 4:00pm</td>
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<td>Dr. Sergiy Minko - Clarkson University</td>
<td>Friday, March 6, 2009, 4:00pm - 5:00pm</td>
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<td>Dr. Frank Vollmer - Harvard University</td>
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<td>Dr. John Perepezko, NAE Member, Univ. of Wisconsin-Madison</td>
<td>Monday, March 16, 2009, 12:00pm - 1:00pm</td>
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<td>Dr. Kathleen Richardson, Clemson University</td>
<td>Thursday, March 19, 2009, 12:00pm - 1:00pm</td>
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<td>Dr. Ana Arias, Palo Alto Research Center</td>
<td>Monday, March 23, 2009, 4:00pm - 5:00pm</td>
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<td>Dr. Shimon Weiss - University of California Los Angeles</td>
<td>Thursday, March 26, 2009, 4:00pm - 5:00pm</td>
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<td>Dr. Saber Hussain - Air Force Research Lab/Wright State</td>
<td>Wednesday, April 2, 2009, 12:00pm - 1:00pm</td>
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<td>Dr. Ismat Shah - University of Delaware</td>
<td>Thursday, April 16, 2009 12:00 pm - 1:00pm</td>
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NanoRomania 2009
June 2nd—5th, 2009 Iasi, Romania
Please consider coming to Iasi, Romania for a fantastic workshop with NSTC faculty members focusing on the future of Energy, NanoBio and Nano-Electronics research. The keynote address will be provided by Dr. Mihail Roco, Senior Advisor for Nanotechnology at NSF. Dr. Roco happens to be a Romanian expatriate and has graciously offered to participate. In addition Dr. Luis Echegoven, Director of the Chemistry Division at NSF, Prof Gheorghe Popa Vice-Rector at the Alexandru Iona Cuza University, and Prof. Marius Andruh, on the Board of Directors of the European Institute of Molecular Magnetism (EIMM) will also be presenting. See http://www.nanoscience.ucf.edu/workshop/index.html for more information.

NanoSummer School
August 5—7th, 2009 Orlando, FL
Take advantage of the upcoming NanoSummer School to learn the latest research techniques. See http://www.nano.ucf.edu/summer for more information.
NanoFlorida 2008 was an overwhelming success with over 200 individuals taking part in this inaugural event. We had over 100 submitted posters & talks from universities across the state as well as from across the nation. We received generous support from local and national companies such as Siemens, Lockheed-Martin, the University of Florida, VaxDesign, Beckman Coulter, NanoHoldings and ChemGlass and hope to attract more corporate sponsorship this year. Please contact Dr. Swadeshmukul Santra at ssantra@mail.ucf.edu if you are interested in sponsoring this event.

Dr. Swadeshmukul Santra continues to lead this event this year with significant input and support from the Steering Committee and Advisory Board members. Some of the members include: Dr. MJ Soileau, VP Research, UCF, Dr. Brij Moudgil, Prof. Matl. Science and Engg., UF; Dr. Harold Kroto, Prof. Chemistry & BioChemistry, FSU etc.

This year the major thrust of NanoFlorida would be towards Nanomaterials for Energy Applications. The talks and posters would also cover a wide variety of topics including: Engineering Nanostructures; Nanobiotechnology/ nanomedicine; Environmental Nanotechnology; and Modeling of Nanostructures. For more information please see: http://www.nanoscience.ucf.edu/nanoflorida/