Texas Nano Summit

Sponsored by:

Nanotechnology Foundation of Texas, Inc.
Rice University
Fulbright & Jaworski, LLC

Nanotechnology Foundation of Texas, Inc.
3307 Virginia Street, Houston, TX 77098
713-521-0992 or info@nanotechfoundation.org

Nano Summit Conference Schedule

Scheduled Time:	Topic, Speaker, Description:	Notes:
8:30 - 8:45	**Welcome**, Conrad Masterson, NanoTex Foundation, cmasterson@nanotex.org, 713-521-0992 and Marc Folladori, Fulbright & Jaworski, mfolladori@fulbright.com , 713-651-5538	
8:45 – 9:15	**Opening Comments**, Richard Smalley, Nobel Laureate, University Professor, Rice University, smalley@ruf.rice.edu , 713-348-4658	
9:15 – 9:30	**Nanoshells: a Photonic approach to Nanobiotechnology** Naomi J. Halas, Professor, Department of Electrical and Computer Engineering and Department of Chemistry, Rice University, halas@rice.edu , (713)348-5611 Nanoshells are precisely layered metallodielectric nanoparticles, developed in the Halas lab at Rice University, whose optical properties can be rationally designed to absorb or scatter light in the near infrared region of the spectrum- the region of highest physiological transmissivity. The combination of high biocompatibility, straightforward bioconjugation chemistry to proteins and other biomolecules, and tunable infrared properties makes Nanoshells ideal for a broad range of in vivo and ex vivo bioengineering applications including whole blood immunoassays, an optically triggerable nanoshell-polymer drug delivery composite, and nanoshell-based targeted photothermal destruction of tumor cells. Research in collaboration with Jennifer West.	
9:30 – 9:45	**Nanoparticle-Biomolecular Sensors for Nanomedicine** James F. Leary, Ph.D., Assistant VP Advanced Technology, and Tarl Prow, M. S. Research Assistant, Applications in Nanomedicine, University of Texas Medical Branch, jleary@utmb.edu and twprow@utmb.edu , 409-747-0547 Nanoparticles and biomolecular sensors are being developed for in-vivo "nanomedicine" treatment, "one-cell-at-a-time", of injury and	

	disease for: (1) repair of radiation damage to DNA in astronauts, (2) repair of hepatitis C infected cells in-vivo, and (3) pulsed light production of action potentials in nanoparticle-human neuron complexes.	
9:45 – 10:00	**Overview of the Center for Biological and Environmental Nanotechnology** Kevin Ausman, Executive Director, Rice University, ausman@rice.edu, 713-348-8212 A discussion of the research accomplishments and plans of the NNI-funded center at Rice.	
10:00 – 10:15	**The Wonders of Single Wall Carbon Nanotubes in the Nano-Vivo World** Robert Hauge, CNL- Center for Nanoscale Science & Technology, Rice University, hauge@rice.edu, 713-348-6384 Single wall carbon nanotubes (SWNT) are made with molecular perfection as tubes with diameters from 0.7 to 3 nanometers with micron lengths. They typically exceed by an order of magnitude the highest electrical, thermal and tensile modulus of extended molecular (polymer) species. A carbon nanotube is a high symmetry carbon only polymer with clearly defined outer and inner surfaces that exhibit distinctly different electrical and chemical behavior. It has also recently been shown that carbon nanotubes both absorb and fluoresce in the near infrared when excited in the visible. This is of interest because the near infrared spectral region is currently underdevelopment for medical imaging applications because of the body's transparency to near infrared light. Possible uses of carbon nanotubes in the nano-vivo world will include applications as nano-sensors, nano-bottles, contrast agents, selective ion transport channels and biocompatible carbon structures.	
10:15 – 10:30	**Fluorescence Studies of Single-Walled Carbon Nanotubes** R. Bruce Weisman, Professor of Chemistry, Rice University, weisman@rice.edu, 713-348-3709 The recent discovery of near-infrared fluorescence from single-walled carbon nanotubes provides a powerful new tool for basic and applied researchers. Using optical	

	methods, nanotubes can now be detected with high sensitivity and selectivity, identified by specific structure, and selectively excited. Current spectroscopic findings will be presented.	
10:30 – 11:00	**Networking Break**	
11:00 – 11:15	**Radiation Studies of Single-Walled Nanotube Materials** Tina Tolpa, Project Coordinator, Center for Applied Radiation Research, Prairie View A&M University, t_tolpa@pvamu.edu, 936-857-4606 The radiation characteristics of nanotube materials and related technologies must be considered for aerospace applications. We will summarize the results of some recent experiments on SWNT buckypapers and discuss the capabilities at Prairie View to perform relevant radiation studies on nanotechnologies.	
11:15 – 11:30	**Potential for Use of Platy Nanoparticles in Biological Systems** Gary W. Beall, Director of the Center for Nanophase Research, Southwest Texas State University, gb11@swt.edu , 512-245-8796 Current research is focusing on the potential use of two classes of platy nanoparticles. The first is a synthetic smectite that has been demonstrated to have strong interactions with amino acids, sugars, and a host of other bio-molecules. The second is hydrotalcites that are very good anion exchangers that interact strongly with many common bio-molecules. These systems are being studied as delivery systems for therapeutic agents and bio-molecules.	
11:30 – 11:45	**Dielectrophoretic Methods for Sample Preparation and Molecular Analysis in Diagnostic Microsystems** Jody Vykoukal, Ph.D., Department of Molecular Pathology, MD Anderson Cancer Center, Jody@dielectrophoresis.org ,713-792-7607 Dielectrophoresis (DEP) is an electrokinetic phenomenon in which polarizability differences between particles and their suspending media are exploited to enable the direct manipulation of particles in	

	inhomogeneous electric fields. A summary of our efforts to develop dielectrophoresis-based micro total analysis systems for sample preparation, cell separation and identification, and molecular analysis will be presented.	
11:45 – 12:00	**Thrusts in Nanoparticle-Related Research** William H. Marlow, Professor Nuclear Engineering Department, Texas A&M University, w-marlow@tamu.edu, 979-845-2271 Discussion of 1) physical interactions of nanoparticles and nanoparticle aggregates in the gas phase, 2) aerosol research for antiterrorism, and 3) measurement of plutonium nanoparticles from aggregate recoil and implications for environmental issues.	
12:00 – 1:00	**Lunch and Networking**	
1:00 – 1:15	**Detection of Vulnerable Plaque** Morteza Naghavi, MD, Assistant Professor, University of Texas at Houston, Director Center for Vulneable Plaque Research, mn@vp.org, 713-500-6549 A presentation on detection of vulnerable plaque (the underlying cause of heart attack) using MRI and Superconductive Quantum Interference Device.	
1:15 – 1:30	**Atomic Force Microscopy and Spectroscopy of Biomembranes** Jason H. Hafner, Department of Physics and Astronomy, Rice University, hafner@rice.edu, 713-348-3205 Biomembranes are complex structures involved in nearly all cellular processes. They are difficult to study by traditional biochemical techniques since their components are amphipathic and therefore not generally soluble in aqueous solutions. Atomic force microscopy (AFM) has great potential in biomembrane research since it can measure nanometer scale topography and force interactions on a 2D surface in aqueous solutions. In our research we will draw on recently developed nanometer-scale technologies such as carbon nanotube probes, nanolithography, and supported bilayer membranes to directly observe the structure, dynamics, and energetics of biomembranes. These techniques will be developed on the	

	erythrocyte plasma membrane since it is relatively simple and has been extensively characterized. We are interested in collaborations to apply these techniques to other systems of biomedical interest.	
1:30 – 1:45	**Theoretical Modeling of Polymer Translocation Through Nanopores** Anatoly B. Kolomeisky, Assistant Professor of Chemistry, Rice University, tolya@rice.edu, (713) 348-5672 Translocation of polymers is crucial in many biological, chemical and industrial processes. We present a theoretical investigation of this process by using simple phenomenological description. Our analysis indicates that the size, geometry of the nanopores and interactions between the polymers and nanopores are important factors in polymer transport across membranes.	
1:45 – 2:00	**A New Microchannel Electrophoresis Device for Simultaneously Separation and Identification of Proteins** Yue Kuo, PhD, Professor of Engineering, Texas A&M University, yuekuo@tamu.edu, 979-845-9807 We are researching a new type of microchannel device that separates and identifies proteins from a mixture within 10 minutes without using the conventional optical method. It only requires 1 microliter of sample solution. The device is potentially applicable to identify proteins in the nanogram range.	
2:00 – 2:15	**Neutral Beam Nanolithography: Breakthrough Technology for the Sub-20 nm Regime** John (Jack) C. Wolfe, Professor of Electrical & Computer Engineering, University of Houston, wolfe@uh.edu, 713-743-4449 Ion Beam Proximity Lithography (IBP) is "stencil printing" where helium ions are the "paint" and the stencils are thin silicon membranes with etched open windows. The resolution of IBP is limited by the deflection of lithography ions by charges in the mask or substrate. This paper describes the use of high-energy helium atoms instead of ions to overcome this limitation. The result is clean	

	20 nm features as never seen with IBP. These results suggest that deep sub-20 nm printing is achievable by neutral beam nanolithography (NBN).	
2:15 – 2:45	**Networking Break**	
2:45 – 3:00	**Attoliter Droplets of High-Concentration Protein Solutions** Dr. Peter G. Vekilov, Associate Professor, Department of Chemical Engineering University of Houston, vekilov@uh.edu , 713-743-4315 I will discuss a method for preparation of such droplets containing from a few hundred to a few thousand protein molecules by utilizing a phase transition characteristic of protein solutions.	
3:00 – 3:15	**Overview of the URETI Grant Research Plans** David C. Zimmerman, Professor and Associate Chairman Dynamic Systems and Control Laboratory, University of Houston, dzimmerman@uh.edu , 713-743-4520 A discussion of the research scope and plans of the newly funded NASA University Research, Education and Technology Institute (URETI) at Texas A&M and the collaborating universities of University of Houston, Rice University, Prairie View A&M, Texas Southern and UT Arlington. The main focus of the Institute is to develop and advance nano and biotechnologies that enable our vision of adaptive, intelligent, shape controllable micro and macro structures, for both advanced aircraft and space systems.	
3:15 – 3:30	**Debrief and Suggestions for Next Nano Summit**	
3:30 – 3:35	**Drawing for Gift Certificates**	
3:35	**Additional Networking**	