



## ***Nanoscale Physics and Chemistry***

**Wednesday, January 24, 2007  
Babbio Bldg, Room 122, Time 11am**

**Professor Leonard C. Feldman**  
Department of Physics and Astronomy and  
Vanderbilt Institute of Nanoscale Science and Engineering, Vanderbilt University

The Vanderbilt Institute of Science and Engineering was created in 2001 to stimulate and facilitate interdisciplinary science and engineering in the nanoscale sciences at Vanderbilt University. It has major emphases in nano-scale optics, nano-biomedical science, computation and semiconductor interfaces. A brief evolution of the Institute, including facilities, will be given with two particular aspects of the broad science program discussed in detail. The first program entails solid-solid phase transitions at the nanoscale: We have created and measured the semiconductor to metal phase transition in nano-scale vanadium oxide (VO<sub>2</sub>). A large size effect in the hysteresis in the phase transition has been observed, a unique property of the nanoscale size. This size dependence is explained in terms of the Turnbull phase transition nucleation model, and can only be observed in nanostructures. A separate program deals with the application of II-VI (CdSe) quantum dots for biological fluorescent marking. Success depends on controlling and understanding the surface and interface structures. This problem will be discussed with a particular analogy to planar semiconductor surfaces.

---

**Leonard C. Feldman** is currently the Stevenson Professor of Physics at Vanderbilt University, Nashville, Tennessee. He is also Professor of Materials Science and Engineering at Vanderbilt, Director of the Vanderbilt Institute of Nanoscale Science and Engineering and Director of the NSF-funded Vanderbilt-Fisk Integrative Research and Training Program (IGERT). His research interests include materials interface issues, with a special emphasis on semiconductor-dielectric problems. He has been particularly active in the development of ion beam techniques for nanostructure fabrication and synthesis of nonmaterial and fabrication of functional nanostructures and devices. He received a B.S. in Physics from Drew University and received a Masters and PhD from Rutgers. Following his PhD he worked at Bell Labs/Lucent for 29 years, with his last position as Department Head, Silicon Materials Research. In 1996 Feldman joined Vanderbilt and was instrumental in establishing their materials and nanoscience programs. He has received a number of awards, including election as a Fellow of the American Physical Society, Fellow of the American Vacuum Society, Fellow of the AAAS, election to the Royal Danish Society and was awarded the APS Adler Prize for research and lecturing in the material sciences. He has co-authored more than 360 publications in peer-reviewed journals, twenty patents and has authored three books on the thin film science. In June of 2007 he will assume the positions of Professor of Physics, Professor of Materials Science and Engineering, Vice-President for Physical Science and Engineering Partnerships and Directorship of the Institute of Advanced Materials, Devices and Nanotechnology at Rutgers.

**Light refreshments will be served prior to seminar**

