The Nanometer Scale

Jay Gupta
Associate Professor, Physics

CURRENT RESEARCH

Connecting small physics to big problems

The nanometer scale is special because it is the length scale at which the 'palette' of the periodic table can be used to make 'paintings' of materials and chemical compounds that are limited only by our imagination, patience, and funding. Dr. Jay Gupta, Professor of Physics at Ohio State University, connects fundamental science of the small to society's biggest problems. For example, he and his group pull, push and prod individual molecules on catalyst surfaces to determine the mechanisms for greenhouse gas recycling into gasoline, powered by sunlight. In like fashion, the team positions individual atoms in semiconducting materials to explore concepts and problems for next-generation information technologies. The most unique aspects of Dr. Gupta's research are the novel techniques and measurements he and his team develop for studying nanoscience problems. Advanced tunneling microscopes are custom-built to study individual atoms and molecules under the most pristine conditions possible today. In this way, Dr. Gupta's team is able to transform some of the most basic science into rigorous studies that can be extended to the complexity of real-world applications.

Recognizing that grand challenges in sustainability and information technologies will require generations of effort, Dr. Gupta's lab engages scientists at all stages of their careers. High school students newly inspired by their AP courses work side by side with postdoctoral researchers ready to transition to their own faculty positions. His policy of engagement isn't confined to the lab however, and he and his team connect their research to the local community through regular lectures at the local science center, participation in physics-themed summer...

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AFFILIATION

Ohio State University

EDUCATION

- Ph.D., in Physics, 2002 , University of California, Santa Barbara
- B.S., in Physics, 1996 , University of Illinois, Urbana-Champaign
- B.S., in Chemistry, 1996 , University of Illinois, Urbana-Champaign

AWARDS

- NSF CAREER Award, 2007
- Arnold and Mabel Beckman Foundation Young Investigator Award, 2007
- Outstanding young physicist prize, American Chapter of the Indian Physics Association, 2007
- IBM Research Division Award: "Spin-flip spectroscopy", IBM 2004
- IBM Research Division Award: "Molecule Cascades", IBM 2003

RESEARCH AREAS

Technology, Chemistry, Materials Science / Physics, Semiconductor

FUNDING REQUEST

Your contributions will support the continued research of Dr. Jay Gupta, of Ohio State University, as he connects the fundamental science of the small to the biggest challenges we face as a society. Donations will fund the $20K/yr needed for the supplies and liquid helium required for his extreme condition experiments, and $170K/year for personnel. An additional $100K would allow Dr. Gupta to purchase a helium recycler that would save on helium costs and pay for itself in just a few years. Donors will have the rare opportunity to control instrumentation remotely and thus be an active part of science. In choosing to donate, you will play a role in advancing science and participating in the discovery process along the way!