

NEWS

by Sharon C. Glotzer

Physics in the City of Angels

The American Physical Society's (APS's) 2005 March meeting in Los Angeles March 20–25 will feature several thousand reports of cutting-edge science and technology and celebrate the World Year of Physics 2005, an international salute to the discipline that coincides with the centennial celebration of arguably the most momentous year in physics. In 1905, Albert Einstein published his pioneering papers in special relativity, quantum mechanics, and Brownian motion—each a major underpinning of modern physics.

During the 2005 March meeting, the APS Forum on Industrial and Applied Physics (FIAP) will focus its annual program contributions on a range of interdisciplinary topics of interest to industrial and applied physicists and engineers, with a particular emphasis on technology sectors important to West Coast companies.

The FIAP program will include nearly two dozen focus sessions and eight invited symposia in areas such as nanotechnology, combinatorial and high-throughput materials, semiconductors, and hydrogen storage. Topics will include complex oxides, which some researchers envision as a replacement for silicon insulators in transistors, semiconductor–oxide interfaces, polymer light-emitting diode (LED) displays, terahertz devices, organic electronics, photonics and magnetics, supercritical carbon dioxide processing for microelectromechanical devices (MEMs) and microelectronics, nanoscale semiconductors, hybrid nanoscale materials, polymer–biopolymer interfaces, materials characterization in the silicon industry, self-assembly of materials (see figure), and inorganic glasses.

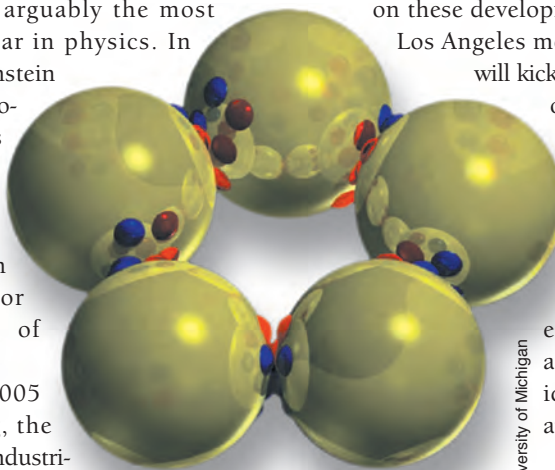
Nanotechnology has seen tremendous activity in the industrial- and applied-physics communities in recent years. Advances in synthesis methods, characterization techniques, and computer simulation are driving new developments in many sectors. FIAP will present several focus sessions and symposia on these developments during the Los Angeles meeting. The week will kick off with a tutorial

on computational nanotechnology, which will cover the latest computer simulation methods for modeling nanomaterials, nanoelectronics, and processes at the nanoscale.

Another session will address challenges to successful self-assembly of the building blocks needed for nanode-

vices, with a particular focus on fabricating new materials and using anisotropic interactions achieved by patterning to control the symmetry of nanoparticles as they assemble into desired structures for device applications. A session on hybrid materials that consist of organic and inorganic constituents, and which interact on the molecular scale, will address the latest advances in the synthesis, assembly, and applications of this exciting class of nanomaterials, which has potential commercial applications in technologies such as solid state lighting, optoelectronics, biocompatible devices, and the packaging of integrated circuits. Recent work in molecular devices and sensors will occupy another session, which will discuss new advances in their fundamental understanding, materials development, assembly and fabrication techniques, and characterization.

FIAP sessions traditionally have emphasized semiconductor physics and its appli-



Self-assembled ring of nanocolloids programmed for assembly via sticky patches, as modeled by computer simulation.

University of Michigan



cations, and the 2005 March meeting will prove no exception. Advances and novel developments in the manipulation of atoms at the interface between oxides and semiconductors will highlight one focus session. Presenters at that session will discuss emerging deposition techniques, improvements in the design of multifunctional oxides, the stability of complex oxides deposited on semiconductors, novel metrology for characterizing interfacial phenomena, and first-principle simulations.

Another focus session will concentrate on the present status and perspective of open-framework, novel electronic materials based on group IV semiconductors as new tunable materials. The latest advances in strained-silicon technology, an innovation in creating faster transistors at reduced cost, will be highlighted in another focus session. Yet a third session will feature recent advances in materials characterization for the semiconductor industry, including advances in structural and physical characterization techniques, novel applications during different stages of the technology cycle, and fundamental physical limitations. The electronic and atomic structure of interfaces in gate stacks, an important issue in the further miniaturization of integrated-circuit devices, will be addressed in three focus sessions.


Polymer LED (PLED) displays are less mature than some other display technologies and have performance issues related to the physics of semiconductor devices. They also pose difficult manufacturing challenges. A focus session and symposium featuring Nobel laureate Alan J. Heeger will address the latest advances in PLEDs. Invited presentations will provide an overview of polymers for displays and present research challenges that physicists must solve to fabricate PLEDs and enhance their performance. Papers will also address questions about the physics of electron-hole capture to produce excitons, and ways to manufacture reliable PLED displays.

Applications of parallel and high-throughput experimentation have leaped beyond screening and discovery tools to provide important product development assistance.

An array of clever approaches and innovative technologies is making research in the physical sciences more productive, rapid, and thorough.

These techniques promise better property correlation, rapid parameter optimization, and enhanced model building, while maintaining quantitative rigor. FIAP will host a symposium surveying recent advances in parallel and high-throughput research methods, including measurement techniques, combinatorial experiment design, automated analysis, and informatics modeling, as well as applications to the development of advanced nanomaterials and electronic materials, complex polymers, next-generation sensors, MEMS devices, and nanometrology.

Inorganic glasses represent one of the oldest classes of technologically relevant amorphous materials. Yet, researchers continue to discover new glass-forming compounds (such as bulk metallic glasses) and amorphous semiconductors (chalcogenide glasses, for example, which have found use in threshold and memory switching) with intriguing properties that enable the development of new technologies. One FIAP focus session will address the synthesis, processing, characterization, structure-property relationships, and fundamental aspects of glass formation.

The FIAP program includes symposia and focus sessions on a broad range of other topics. The complete FIAP program will be available six weeks before the March meeting at www.aps.org. Follow the link to the FIAP home page or go to the APS 2005 March meeting page. 

B I O G R A P H Y

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