Institute for Collaborative Biotechnologies

SEMINAR

Tuesday, May 22, 2007 3:00 pm / Refreshments at 2:45 pm 1001 Engineering Science Building

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ICE

Nanowire Photonics

The manipulation of optical energy in structures smaller than the wavelength of light is key to the development of integrated photonic devices for computing, communications and sensing. Wide band gap semiconductor nanostructures with near-cylindrical geometry and large dielectric constants exhibit twodimensional ultraviolet and visible photonic confinement (i.e. waveguiding). Combined with optical gain, the waveguiding behavior facilitates highly directional lasing at room temperature in controlled-growth nanowires with suitable resonant feedback. We have further explored the properties and functions of individual ultralong crystalline oxide nanoribbons that act as subwavelength optical waveguides, nonlinear frequency converter and assess their applicability as nanoscale photonic elements and scanning probes. Semiconductor nanowires offer a versatile photonic platform due to the ability to specify material size, shape, and composition. The integration of multiple unique materials with distinct thermal, optoelectronic, and mechanical properties promises to enable advances for several applications ranging from information processing to biochemical sensing.

Biography

Professor Peidong Yang received a B.S. in chemistry from University of Science and Technology of China in 1993 and a Ph.D. in chemistry from Harvard University in 1997 for work on flux line pinning in the laboratory of Professor Charles Lieber. He then did postdoctoral research in the area of mesoporous materials with Professor Galen Stucky at University of California, Santa Barbara. He began his faculty appointment in the Department of Chemistry at the University of California, Berkeley on July 1, 1999.

In addition to his faculty appointments, Prof. Yang the deputy director for Center of Integrated Nanomechanical Systems, Berkeley and faculty scientist of Materials Science Division, Lawrence Berkeley National Laboratory. Professor Yang is the first chairperson for the subdivision of Nanoscience, American Chemical Society. He also serves as associate editor for the Journal of the American Chemical Society.

Professor Yang is an Alfred P. Sloan research fellow (2001-2004), MIT Tech. Review TR 100 (2003); and has been awarded a Camille Dreyfus new faculty award (1999), the Arnold and Mabel Beckman Young Investigator Award (2002), National Science Foundation Young Investigator Award (2000-2004), ExxonMobil Solid State Chemistry fellowship (2000), Camille Dreyfus Teacher-Scholar Award (2004), Dupont Young Professorship (2004), MRS Outstanding Young Investigator Award (2004), Julius Springer Prize for Applied Physics (2004), and ACS Pure Chemistry Award (2005).

The Yang research group is interested in the synthesis of new classes of materials and nanostructures, with an emphasis on developing new synthetic approaches and understanding the fundamental issues of structural assembly and growth that will enable the rational control of material composition, micro/nanostructure, property and functionality. We are interested in the fundamental problems of electron, photon, phonon and ionic confinement within 1-dimensional nanostructures and their applications in nanophotonics, nanoelectronics, energy conversion and nanofluidics.