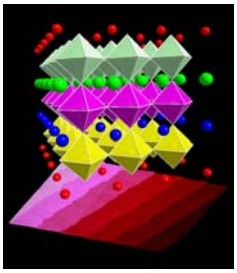
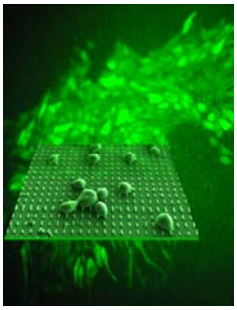
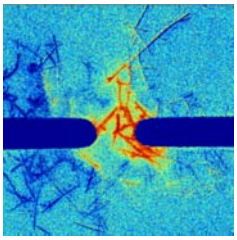
Center for Nanophase Materials Sciences (CNMS)

CNMS DISCOVERY SEMINAR SERIES







Joint Meeting with the

MATERIALS SCIENCE AND TECHNOLOGY DIVISION

Friday, June 2, 2006
11:00 am
CNMS Executive Conference Room (8610, L-183)

Refreshments will be served at 10:45 am

"Electron Transport in Individual Single Wall Carbon Nanotubes and Superconducting $NbSe_2$ Nanowires"

Zhixian Zhou
Materials Science and Technology Division
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Abstract

Single wall carbon nanotube (SWNT) devices with a suspended tube electrically contacting a pair of opposing Au electrodes have been fabricated *in situ* using a molecular beam method. The as-grown devices are imaged by scanning electron microscopy, and atomic force microscopy is used to determine the carbon nanotube diameter distribution. The semiconducting SWNTs exhibit a significant electric field effect at room temperature with the conductance modulation approaching 6 orders of magnitude. Low temperature electrical transport measurements of metallic SWNTs reveal single quantum dot, double quantum dot or multiple quantum dot behavior that is governed by the presence of defects in the as-grown devices. We demonstrate that the defect-related electron transport is affected not just by the substrate temperature but also by the nature and the composition of the carbon feedstock. Electrical transport properties of individual superconducting $NbSe_2$ nanowires also have been studied at low temperatures and the results will be discussed.

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