Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Studies of electronic excitations of rectangular ZnO nanorods by electron energy-loss spectroscopy CHIEN-TING WU, National Nano Device Laboratories, National Applied Reasearch Laboratories, Taiwan, MING-WEN CHU, Center for Condensed Matter Sciences, National Taiwan University, Taiwan, CHUAN-PU LIU, Dept. of Materials Science and Engineering, National Cheng Kung University, Taiwan, KUEI-HSIEN CHEN, Institute of Atomic and Molecular Sciences, Academia Sinica, Taiwan, LI-CHYONG CHEN, Center for Condensed Matter Sciences, NTU, Taiwan, CHUN-WEI CHEN, Dept. of Materials Science and Engineering, NTU, Taiwan, CHENG-HSUAN CHEN, Center for Condensed Matter Sciences, NTU, Taiwan — Electronic excitations of single ZnO rectangular nanorod have been investigated by electron energy-loss spectroscopy in conjunction with scanning transmission electron microscopy (STEM-EELS). We focus primarily on the surface excitations greatly enhanced at the grazing incidence parallel to the surfaces of ZnO nanorods. An uncommon kind of surface excitation known as surface exciton polaritons occurring near interband transitions is found to dominate in the spectral range between the band gap at 3.4 eV and the surface plasmon peak at 15.8 eV. In addition, the dielectric function of ZnO up to 25 eV has also been derived from the bulk excitation spectra using the Kramers-Kronig analysis on a single nanorod. Theoretical EELS simulations are also compared with the experimental results and good agreements are obtained.

Chien-Ting Wu
National Nano Device Laboratories,
National Applied Reasearch Laboratories, Taiwan

Date submitted: 29 Nov 2011 Electronic form version 1.4