Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Confocal Raman microscopy of one dimensional ZnO nanostructures SRIKANTH SINGAMANENI, MANEESH GUPTA, RUSEN YANG, ZHONG WANG, VLADIMIR TSUKRUK, Georgia Institute of Technology, GIT/MSE TEAM — ZnO nanostructures with various shapes (vertically aligned nanorods, nanobelts, nanohelixes, nanorings) have been synthesized using both vapor phase and solution growth methods. In the simplest example of a nanobelt, the fast growth direction can be either $(2\bar{1}\bar{1}0)$ or $(01\bar{1}0)$ or (0001). Here, we show that confocal Raman microscopy can be employed as a fast and nondestructive analytical technique to identify the crystal planes and reveal the relative orientation of the ZnO nanostructure. Various features of the Raman spectrum of ZnO nanostructures (presence of the A_1(TO) mode, width of the E_2 mode) were found to be sensitive to relative orientation of the incident source laser and the crystal plane. Furthermore, owing to the optical anisotropy of ZnO, Raman scattering from the substrate is modulated (either enhanced or suppressed with respect to the background) depending on the polarization of the incident light with respect to orientation of the nanobelt. The results presented here describe a novel method to nondestructively identify the growth, relative orientation, and the waveguiding properties of the ZnO nanostructures.

Srikanth Singamaneni
Georgia Institute of Technology

Date submitted: 21 Nov 2008 Electronic form version 1.4