Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Band structure and absorption spectrum of double-walled zigzag carbon nanotubes in an electric field[1] YEN-HUNG HO, G. W. HO, M. F. LIN, Department of Physics, National Cheng Kung University, C. P. CHANG, Center for General Education, Tainan Woman's College of Arts and Technology — The electronic structure of the (9,0)-(18,0) double-walled zigzag carbon nanotubes in the presence of a uniform transverse electric field is studied by the tight-binding model. The electric field could induce the semiconductor-metal transition, change the direct gap into the indirect gap, alter the subband curvatures, destroy the double degeneracy, produce the new band- edge states, make more subbands group around the Fermi level, and widen the π-band width. Such effects are directly reflected in density of states and optical excitation spectra. The absorption spectra exhibit a lot of prominent peaks, mainly owing to the rich one-dimensional energy subbands. The intensity, the number, and the frequency of absorption peaks are strongly modulated by the electric field. The modulation of electronic and optical properties is amplified by the parallel magnetic field. The predicted electronic and optical properties can be, respectively, verified by the conductance measurements and the optical spectroscopy.

[1]NSC 93-2112-M-006-002, NSC 93-2112-M-145-001; NSC 93-2112-M-165-001

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Date submitted: 30 Nov 2005 Electronic form version 1.4