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Electronic and optical properties of finite carbon nanotubes in an electric field R.B. CHEN, Center of General Studies, National Kaohsiung Marine Univ., C.H. LEE, M.F. LIN, Dept. of Physics, Natl. Cheng Kung Univ., C. P. CHANG, Center for General Education, Tainan Woman's College of Arts Tech. — The effects, caused by the geometric structure and a transverse electric field (**E**), on the electronic and optical properties of quasi-zero-dimensional finite carbon nanotubes are explored by employing the tight-binding model coupled with a curvature effects. It is found that the electronic properties (discrete state energies, symmetry of electronic states, energy spacing, and state degeneracy) are significantly affected by **E** and the geometric structure (radius, length, and chirality). The electric field, by lowering the symmetry of finite carbon nanotubes, modifies the electronic properties. Thus, the optical excitation spectra, excited by electric polarization parallel to the nanotube axis, exhibit rich delta- function-like peaks, which reveal the characteristics of the electronic properties. Therefore it follows that geometric structure and **E** influence the low-energy absorption spectra, i.e., the change of frequency of the first peak, the alternation of the peak height, and the production of the new peaks. Moreover, the very complicated optical absorption spectra are characteristic for individual the chiral carbon nanotube due to its specific geometric structure. Above all, the predicted absorption spectra and the associated electronic properties could be verified by optical measurements. Supported by NSC 94-2112-M-022-001; NSC 94-2112-M-165-001; NSC 94-2112-M-006-002.

R. B. Chen
Center of General Studies, National Kaohsiung Marine University

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