Electron Standing Waves in Semiconducting Carbon Nanotubes: Spatially-Resolved Scanning Tunneling Spectroscopy

SE-JONG KAHNG, Department of Physics, Korea University, HAJIN KIM, SUNGJUN LEE, YOUNG KUK, School of Physics and Center for Science in Nanometer Scale, Seoul National University — Electronic modulation patterns were observed, from the gap states of semiconducting single-wall carbon nanotubes, using spatially-resolved scanning tunneling spectroscopy. Some modulations show single peaks, with the period twice of the lattice constants, while others show double peaks. Both modulations are localized within a few nano-meters, enclosed by exponential decay functions. The modulation patterns are well understood in terms of the squared wavefunctions, derived from the simple quantum mechanical potential well models. Our model can be applied to the bound states of metallic carbon nanotubes as well.