

Visualization of quantum dot formation in a strained CNT device

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Strained parts of a carbon nanotube (CNT) in a CNT-based field effect transistor were identified topographically by the atomic force microscopy (AFM) and the charge accumulation in a region between the two strained parts was observed by the scanning Kelvin probe microscopy (SKPM). At this region, the device conductance was greatly affected by local moving-gate (probe tip) voltages during the scanning gate microscopy (SGM) measurements for the visualization of detailed device characteristics. Concentric conductance rings indicating the Coulomb oscillations were clearly observed at low temperatures in SGM images, which was attributed to the formation of a quantum dot between the tunneling barriers at the strained parts of the CNT.