Title:STARK SPECTROSCOPY OF Ge/Si(001) SELF-ASSEMBLED QUANTUM DOTS

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Abstract:
Stark spectroscopy was employed to study interband optical transitions in an array of Ge/Si self-assembled quantum dots. The mean diameter and height of the Ge nanoclusters are about 6 nm and 4 nm, respectively. Under an applied electric field splitting of the exciton ground state is observed, implying that the dots possess two permanent dipole moments of opposite sign. We argue that the two possible orientations of the electron-hole dipole in each Ge dot are the result of the spatial separation of electrons which can be excited in Si as well as on top and below the Ge nanocluster. The separation of electron and hole is determined to be (5.1±0.2) nm for the top (apex) electron, and (0.8±0.3) nm for the bottom (base) electron, yielding a distance between the electrons of (5.9±0.5) nm, which is consistent with the staggered band line-up inherent to type-II quantum dots.

Keywords: Quantum dots; Stark effect; interband transitions

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