PHOTOCONDUCTIVITY AND FIELD-ASSISTED PHOTOEMISSION IN MULTILAYER Si/Ge HETEROSTRUCTURES WITH QUANTUM DOTS

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S u m m a r y

Lateral photoconductivity spectra and current-voltage characteristics of field-assisted photoemission from multilayer Ge/Si heterostructures with SiGe quantum dots (QDs) have been studied. Atomic force microscopy images of the top layer showed that nanoislands were tetrahedral pyramids by shape, about 30 nm in base and about 2 nm in height. Their average surface concentration is about 10^{10} cm^{-2}. The photocurrent spectroscopy studies of the structures are carried out at a temperature of 77 K and in the quantum energy range from 0.29 to 1.0 eV. Two peaks of the lateral photocurrent with the maxima observed at 0.32 and 0.34 eV are explained by intraband transitions between localized states in the valence band of nanoislands. A peak observed in the *I–V* curve of the field-enhanced photoemission from QDs is associated with the resonant tunneling of electrons from the Si valence band into vacuum via quantized energy levels in QDs. The intraband transitions from localized states in the valence band of Ge nanoislands are found to be responsible for the photocurrent and the field-enhanced photoemission of electrons observed in the Si/Ge heterostructures with QDs under study.