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Title:Intersublevel spectroscopy on single InAs-quantum dots by terahertz near-field microscopy
Authors:Jacob, Rainer (1); Winnerl, Stephan (1); Fehrenbacher, Markus (1); Bhattacharyya, Jayeeta (1); Schneider, Harald (1); Wenzel, Marc Tobias (2); Ribbeck, Hans-Georg Von (2); Eng, Lukas M. (2); Atkinson, Paola (3); Schmidt, Oliver G. (3); Helm, Manfred (1)
Author affiliation:(1) Institute of Ion Beam Physics and Materials Research, Helmholtz-Zentrum Dresden-Rossendorf, P.O. Box 51 01 19, 01314 Dresden, Germany; (2) Institut für Angewandte Photophysik, Technische Universität Dresden, 01062, Dresden, Germany; (3) Institute for Integrative Nanosciences, IFW Dresden, Helmholtzstrasse 20, 01069 Dresden, Germany
Corresponding author:Winnerl, S.(s.winnerl@hzdr.de)
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Abstract:Using scattering-type near-field infrared microscopy in combination with a free-electron laser, intersublevel transitions in buried single InAs quantum dots are investigated. The experiments are performed at room temperature on doped self-assembled quantum dots capped with a 70 nm GaAs layer. Clear near-field contrast of single dots is observed when the photon energy of the incident beam matches intersublevel transition energies, namely the p-d and s-d transition of conduction band electrons confined in the dots. The observed room-temperature line width of 5-8 meV of these resonances in the mid-infrared range is significantly below the inhomogeneously broadened spectral lines of quantum dot ensembles. The experiment highlights the strength of near-field microspectroscopy by demonstrating signals from bound-to-bound transitions of single electrons in a probe volume of the order of (100 nm)³. © 2012 American Chemical Society.
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Uncontrolled terms:Bound-to-bound transition - Conduction band electrons - GaAs - InAs quantum dots - Incident beams - Infrared microscopy - Intersublevel transitions - Micro spectroscopy - Mid-infrared range - Near field microscopy - Near-field - Photon energy -

Quantum dot ensemble - Room temperature - Self assembled quantum dots - Single electron - Single quantum dot - Spectral line - Tera Hertz
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