

Abstract Submitted
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Characterization of (In,Ga)As Quantum Posts for Terahertz Quantum Information Processing C. M. MORRIS, D. G. ALLEN, UCSB Physics Dept., J. HE, UCSB Electrical and Computer Engineering Dept., C. PRYOR, University of Iowa Dept. of Physics and Astronomy, P. M. PETROFF, UCSB Electrical and Computer Engineering Dept., M. S. SHERWIN, UCSB Physics Dept. — Quantum posts (QPs) are a new kind of self-assembled semiconductor nanostructure which may be suitable for quantum information processing using terahertz frequencies.¹ A QP is a roughly cylindrical In-rich region embedded in a GaAs matrix whose height can be controlled with monolayer resolution. For a single electron trapped in a 40 nm high QP, the orbital transition between the ground and first excited state is predicted to occur near 1 THz. Since this is well below the optical phonon frequency (9 THz), decoherence is expected to arise primarily from very weak interactions with acoustic phonons. QPs grown in the insulating region of a metal-insulator-semiconductor structure allow voltage-controlled charging, which is measured by capacitance-voltage spectroscopy. Terahertz absorption spectra are also measured by Fourier-transform infrared spectroscopy. ¹ M. S. Sherwin, A. Imamoglu and C. Montroy, PRA 60, 3508 (1999) Work supported by the NSF NIRT grant No. CCF 0507295

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