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Electron Spin Resonance on Arrays of Etched Quantum Dots in ^{28}Si/SiGe JIANHUA HE, A. M. TYRYSHKIN, S. A. LYON, Princeton University, D. E. SAVAGE, M. A. ERIKSSON, University of Wisconsin-Madison — Relaxation times of 2-dimensional electrons in Si quantum wells (QW) in Si/SiGe heterostructures are found to be shorter than the extremely long relaxation of 3-dimensionally confined donor- bound electrons in Si. Confining the electrons into quantum dots (QD) could suppress the Dyakonov-Perel spin relaxation due to fluctuating Rashba fields, and thus lead to long relaxation times for electrons in QDs. We have developed a reliable, low- defect density process to pattern large area 2D arrays (several cm^2) of nominally 100nm dots with a 200nm pitch in a CVD grown ^{28}Si/SiGe quantum well. The process involves nanoimprinting, reactive ion etching and wet etching. Scanning electron microscopy (SEM) and atomic force microscopy (AFM) imaging has been used to characterize the etch depth (various depths up to 60nm) and uniformity. After etching we find an electron spin resonance signal with a g-factor of 1.9998, which is considerably shifted from that of the unetched QW (2.0003). This line exhibits anisotropies of its g-factor and linewidth that are similar to those of 2D electrons, as might be expected for large, flat QDs. This new line is also broader (420 mG) than that from the unetched QW (90 mG) which could result from an inhomogeneity in dot sizes.

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