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Electron spins at metal-oxide-silicon (MOS) interfaces[1] J.-S. KIM, R.M. JOCK, A.M. TYRYSHKIN, S.A. LYON, Department of Electrical Engineering, Princeton University — Single electron spins confined in lithographically defined quantum dots in silicon demonstrate long coherence times and are an attractive candidate for qubits and quantum computing applications. Confining electrons at the interface of a metal-oxide-silicon (MOS) structure, as opposed to other Si-based heterostructures, allows for smaller quantum dots by bringing the 2-dimensional electron gas closer to the confining gates. In order to use these electrons as qubits they must be individually confined in quantum dots, but defects at the oxide-silicon interface can lead to unintended electron trapping. The density and depth of these states are functions of the oxide quality and device processing conditions. As such, we have tailored our fabrication process to avoid any high energy processes after the final high temperature anneal. In this work we will characterize the density of trap states in a large area MOS device using electron spin resonance techniques and will present work towards the fabrication of MOS quantum dots.

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