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**Towards force detected single electron spin resonance at room temperature** C.C. WILLIAMS, A. PAYNE, K. AMBAL, C. BOEHME, University of Utah — Electrically detected magnetic resonance (EDMR) spectroscopy has shown that electron tunneling at or within silicon dioxide layers is strongly dependent on spin-selection rules [1]. Also demonstrated is the detection of single electron tunneling events by electrostatic force with sub-nanometer spatial resolution [2,3]. Here we propose to combine force detected single electron tunneling microscopy with EDMR to demonstrate a new kind of single spin force microscope. This approach has much better sensitivity than magnetic force based single spin microscopes [4], since electrostatic forces are much larger than corresponding magnetic forces. In this method, a paramagnetic state in an oxidized AFM probe tip is brought within tunneling range of a paramagnetic state in an oxide surface [5]. Under appropriate energy conditions, one of the unpaired electrons can randomly tunnel between the two states causing a random telegraph signal (RTS) to appear on the AFM cantilever frequency. Simulations predict that if magnetic resonance conditions are achieved, a measurable change in the RTS signal is detectable at room temperature. The theory and a quantitative simulation of this atomic scale spin resonance measurement will be presented, along with experimentally observed random telegraph signals.

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