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Pulsed electrically detected magnetic resonance of phosphorus donors near the Si(111)-SiO_2 interface SEOYOUNG PAIK, HEATHER SEIPEL, SANG-YUN LEE, THOMAS HERRING, DANE MCCAMEY, CHRISTOPH BOEHME, Department of Physics, University of Utah — Recently, there has been a large effort towards the electrically detection of spin coherence of phosphorus donor electrons in silicon. These studies have been undertaken on the Si (100) interface, due to its wide utilization in the semiconductor industry. Here, we present a pulsed electrically detected magnetic resonance study on P donors near the Si(111) interface. We observe the transient current after a short, coherent microwave pulse as a function of both the magnitude and relative orientation (with respect to the [111] direction) of the applied magnetic field. Similar to previous Si(100) studies, we observe three resonant peaks, which we attribute to a) the two well known hyperfine spilt phosphorus resonances, and b) the P_b defect resonance. The P_b resonance exhibited an anisotropy with field direction, in agreement with conventional ESR studies. In addition, we observe a fourth isotropic resonance, with a g-factor of $g = 2.0031 \pm 0.0004$. We conclude that, aside from the anticipated and well know P-P_b transition, at least one additional spin dependent recombination pathway exists at the Si(111)-SiO_2 interface.

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