Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Process integration and electron spin coherence of donor atom implants in silicon T. SCHENKEL, Lawrence Berkeley Laboratory, A. PERSAUD, LBNL, A. M. TYRYSHKIN, S. A. LYON, Princeton University, J. BOKOR, C. C. LO, R. DESOUSA, UC Berkeley, I. CHAKAROV, Silvaco Internat. — We implanted low doses (2 to 4 x $10^{11}_{c} m^{-2}$) of P, Sb, and Bi ions into isotopically enriched silicon (28-Si) and characterized diffusion, electrical activation and electron spin coherence after rapid thermal annealing. Phosphorus and bismuth both exhibit enhanced segregation to an imperfect Si/SiO2 interface, while dopant movement is suppressed for antimony ions. Pulsed electron spin resonance shows that spin echo decay is sensitive to the dopant depths, and the interface quality. At 5.2 K, a spin de-coherence time, T2, of 0.3 ms is found for Sb profiles peaking 50 nm below a Si/SiO2 interface, increasing to 0.75 ms when the surface is passivated with hydrogen. These measurements provide benchmark data for the development of devices in which quantum information is encoded in donor electron spins [1]. [1] T. Schenkel, et al., Appl. Phys. Lett. 88, 112101 (2006).

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Date submitted: 02 Dec 2006 Electronic form version 1.4