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The role of interface magnetic centers on the spin lifetime measured in doped SrTiO3 using Hanle technique WEI HAN, XIN JIANG, IBM Almaden Research Center, ADAM KAJDOS, Materials Department, University of California, Santa Barbara, SEE-HUN YANG, IBM Almaden Research Center, SUSANNE STEMMER, Materials Department, University of California, Santa Barbara, STUART PARKIN, IBM Almaden Research Center — Recently, the two dimensional electron gas that is formed at the surface of strontium titanate, SrTiO3 (STO), has attracted considerable attention, both concerning its origin as well as the many phenomena that it apparently displays: these include, gate tunable metallicity and superconductivity, and magnetic effects including Kondo scattering. Here, we report electrical injection and detection of spin currents in Nb doped STO substrates and La doped STO thin films using the Hanle technique and CoFe / MgO tunnel spin injectors. The spin lifetimes measured are on the order of 100 ps and vary little with temperature for temperatures varying from 10 K to 300 K, whereas the mobility of the STO has very strong temperature dependence. This suggests that the spin lifetime is limited by spin-dependent scattering at the MgO/STO interface, perhaps related to the formation of Ti3+ or other magnetic centers. Of considerable interest is that the spin lifetime decreases systematically with increasing dopant concentration, indicating that the number of magnetic centers at the interface increases with increasing dopant concentration. These results reveal a severe limitation of the Hanle technique for measuring spin lifetimes within the interior of the subject material.

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