Abstract Submitted
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Near Room Temperature Kondo-Suppression of Spin Accumulation in Cu-Based Non-Local Spin Valves[1] JUSTIN WATTS, University of Minnesota, LIAM O'BRIEN, University of Minnesota, University of Cambridge, PAUL CROWELL, CHRIS LEIGHTON, University of Minnesota — Recent studies on metallic non-local spin valves have focused on the anomalous temperature dependence of the spin accumulation signal, ΔR_{NL}, which unexpectedly decreases at low temperatures. O'Brien *et al.* (Nat. Commun. **5**, 3927, 2014) advanced an explanation, based on interdiffusion-induced local moments suppressing injected spin polarization via a manifestation of the Kondo effect. Here we extend this work to devices based on Co/Cu, a combination for which the Kondo temperature can exceed 300 K. Non-magnetic channel thicknesses, t_N, from 50 to 200 nm have been explored, along with annealing temperatures up to 500 ^{o}C. The decrease in spin diffusion length in Cu from 300 nm for t_N = 200 nm to 90 nm for t_N = 50 nm, and its change with annealing, will be discussed in detail. Most importantly we find that, despite the limited miscibility of Co in Cu, a significant decrease in ΔR_{NL} occurs with decreasing temperature as the Cu channel thickness is reduced. In the thinnest channels we find the maximum in ΔR_{NL} occurs near room temperature. This result implies that local moment formation and the associated Kondo physics can impact the performance of spin transport devices at ambient temperature in a very common and technologically important materials system.

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