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Role of spin polarization in FM/Al/FM trilayer film at low temperature NING LU, RICHARD WEBB, Univ of South Carolina — Measurements of electronic transport in diffusive FM/normal metal/FM trilayer film are performed at temperature ranging from 2K to 300K to determine the behavior of the spin polarized current in normal metal under the influence of quantum phase coherence and spin-orbital interaction. Ten samples of Hall bar with length of 200 micron and width of 20 micron are fabricated through e-beam lithography followed by e-gun evaporation of $Ni_{0.8}Fe_{0.2}$, aluminum and $Ni_{0.8}Fe_{0.2}$ with different thickness (5nm to 45nm) in vacuum. At low temperature of 4.2K, coherent backscattering, Rashba spin-orbital interaction and spin flip scattering of conduction electrons contribute to magnetoresistance at low field. Quantitative analysis of magnetoresistance shows transition between weak localization and weak anti-localization for samples with different thickness ratio, which indicates the spin polarization actually affects the phase coherence length and spin-orbital scattering length. However, at temperature between 50K and 300K, only the spin polarization dominates the magnetoresistance.

Ning Lu
Univ of South Carolina

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