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Alkanethiol capping-induced changes in the magnetoresistance of Co BRAD KNAUS, SAMIR GARZON, THOMAS M. CRAWFORD — We demonstrate that chemisorption of a ~ 1 nm thick dodecanethiol ($C_{12}H_{25}SH$) self-assembled monolayer on the surface of an Au film alters the magnetotransport of an underlying Co film. Giant paramagnetism has been previously detected in Au thin films and nanoparticles capped with alkanethiols via SQUID magnetometry. By observing the impact of Au-thiol magnetism on a ferromagnetic thin film we avoid background subtraction and the influence of impurities. After thiolation, significant changes are observed in the anisotropic magnetoresistance (AMR) and planar Hall effect (PHE) from Co/Au bilayers (30 nm/5-60 nm) patterned into 1 x 5 mm^2 bars. Driven with nearly perpendicular external fields, we observed domain nucleation shifts of $\sim$0.65 T and changes in the FWHM of the AMR. We have also measured differences in the MR as a function of ambient exposure time presumably due to oxidation effects known to occur in alkanethiols. Effects of surface scattering were eliminated with the introduction of a 12nm Al_2O_3 insulation barrier between Co and Au. We have calculated that the effects of magnetostriction are too small by more than two orders of magnitude to explain our observations. We therefore hypothesize that Au-thiol magnetization acts as a source of magnetic field which biases the underlying Co film.

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