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Induced Magneto-transport Effects in Non-magnetic Metals on Yttrium Iron Garnet[1] TAO LIN, CHI TANG, JING SHI, Department of Physics and Astronomy, University of California, Riverside, CA, 92521 — Yttrium iron garnet (YIG) was called "spin Seebeck insulator," for it supports heat-generated pure spin currents. Pt thin film, with strong spin-orbit interaction, is used as a spin current generator or detector based on the spin Hall effect or the inverse spin Hall effect. The combination of these two materials plays a very important role in spintronics. A recent magnetotransport study shows strong evidence of a magnetic proximity effect in thin Pt films deposited on YIG. Here, we present a magneto-transport study of several non-magnetic (NM) metal films (e.g. Pt, Pd) on YIG films grown on gadolinium gallium garnet substrates with laser molecular beam epitaxy. The anisotropic magnetoresistance (AMR) and anomalous Hall effect (AHE) reveal clear ferromagnetic characteristics in NM films. The magnitude of the AHE angle Θ in Pd/YIG structure increases with decreasing temperature, while Θ in Pt/YIG structure has a sign reversal at an intermediate temperature. Both AMR and AHE have been investigated as the NM film thickness is varied and an optimal effective thickness is identified. The effect of annealing has also been studied and the results are consistent with the observed thickness dependence. In thin NM films, a ln(T) temperature dependence with a resistivity minimum is observed at low temperatures, suggesting that the Kondo effect may be relevant. Detailed discussions about the origin of these effects will be presented.

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