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POS-G73 – Pure-spin-current diode-like effect at the Au/Pt interface

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Asymmetric charge transport at the interface of two materials with dissimilar electrical properties, such as metal/semiconductor and p-n junctions, is the fundamental feature behind modern diode and transistor technology. Spin pumping from a ferromagnet into an adjacent non-magnetic material is a powerful technique to generate pure-spin-currents, wherein spin transport is unaccompanied by net charge transport. It is therefore interesting to study pure-spin transport at the interface of two materials with different spin transport properties. Here we demonstrate asymmetric transport of pure-spin-currents across an interface of dissimilar non-magnetic materials Au/Pt. We exploit Py/Au/Pt/Co structures where spin pumping can generate pure-spin-current from either Py or Co independently. We find that the transmission of pure-spin-current from Au into Pt is more than twice as efficient as transmission from Pt into Au. Experimental results are interpreted by extending conventional spin-pumping/spin-diffusion theory to include boundary conditions of reflected and transmitted spin-current at the Au/Pt interface that are proportional to the established spin chemical potentials on either side of the interface.

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