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Interfacial Spin Dephasing and Spin Absorption in Graphene Probed by Pure Spin Current[1] WALID AMAMOU, UC Riverside, GORDON STECKLEIN, University of Minnesota, TIANCONG ZHU, SIMRANJEET SINGH, JYOTI KATOCH, Ohio State University, SEROL TURKYILMAZ, CENGIZ OZKAN, UC Riverside, STEVEN KOESTER, PAUL CROWELL, University of Minnesota, ROLAND KAWAKAMI, Ohio State University, KOESTER GROUP TEAM, CROWELL GROUP TEAM — In order to understand the limiting factors for achieving magnetization switching using graphene, we study the spin absorption of a Fe nanomagnet deposited on a graphene spin valve. A pure spin current is injected into the graphene channel via electrical spin injection through a Co(80nm)/SrO(1nm) tunnel barrier junction. The generated pure spin current inside the graphene spin channel is partly absorbed by a nanomagnet grown on top of the spin channel allowing a direct determination of the absorbed spin current. We perform non-local magnetoresistance (MR) and Hanle spin precession measurement as we gradually deposit Fe in-situ inside an MBE chamber. We observe a rapid decrease of the non-local MR signal for a thickness ranging from 0 Å to 1Å followed by slower decrease and a saturation of the spin signal above 1 nm of Fe.Using 2D finite element modeling of the spatial distribution of the spin accumulation in the graphene channel, we extract an absorbed spin current of 2.9 x 10^6 A/m^2. By introducing a Cu spacer between the Fe and Graphene, we are able to decrease this rapid decay and observe a clear exponential decay due to the spin absorption into the Fe island. These results provide the first demonstration of interfacial spin dephasing in Graphene.

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