Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Simultaneous magnetic force microscopy and electrical transport measurements of a graphene non-local spin valve MICHAEL PAGE, ANDREW BERGER, HUA WEN, VIDYA BHALLAMUDI, ROLAND KAWAKAMI, P. CHRIS HAMMEL, Ohio State University — Non-local signals in graphene spin valves depend on the magnetization states of the ferromagnetic electrodes. Currently, determining the relative influence of each magnetic electrode relies on fitting the non-local signal to the one-dimensional spin diffusion model. We report imaging of the magnetization states of the spin valve electrodes using a custom magnetic force microscope, while simultaneously acquiring the non-local spin signal electrically. This allows direct correlation of the non-local signal features to the switching of the individual electrodes and determination of the relative contribution to the signal by the participating electrodes. We also image the formation and motion of domain walls near the graphene transport channel and correlate these with features in the non-local signal. This measurement technique supports the one-dimensional spin diffusion model and provides information necessary for reliable switching behavior in spin valves with magnetic electrodes.

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Date submitted: 14 Nov 2014 Electronic form version 1.4