Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Spin-to-charge-current conversion in yttrium iron garnet-graphene hybrid structure[1] JOAQUIM MENDES, Universidade Federal de Vicosa, OBED ALVES SANTOS, Universidade Federal de Pernambuco, LEONEL MEIRELES, RODRIGO LACERDA, Universidade Federal de Minas Gerais, LUIS VILELA-LEO, FERNANDO MACHADO, ROBERTO RODRGUEZ-SUREZ, ANTONIO AZEVEDO, SERGIO REZENDE, Universidade Federal de Pernambuco — The use of graphene in spintronic devices depends, among other things, on its ability to convert a spin excitation into an electric charge signal, a phenomenon that requires a spin-orbit coupling (SOC). In this work we report the observation of two effects that show the existence of SOC in large-area CVD grown single-layer graphene (SLG) deposited on a single crystal film of the ferrimagnetic insulator yttrium iron garnet (YIG). The first is a magnetoresistance of graphene induced by the magnetic proximity effect with YIG. The second is the detection of a DC voltage along the graphene layer resulting from the conversion of the spin current generated by spin pumping from microwave driven FMR into charge current. We interpret the spin-to-charge conversion as arising from the inverse Rashba-Edelstein effect (IREE) made possible by the extrinsic spin-orbit coupling in graphene. These observations show that spin orbit coupling can be extrinsically enhanced in graphene by the proximity effect with a ferromagnetic layer. This result opens new possibilities for the use of graphene in spintronic devices with unique functionalities.

[1]Research supported in Brazil by the agencies CNPq, CAPES, FINEP, FAPEMIG, FACEPE, and in Chile by FONDECYT No. 1130705

Joaquim Mendes
Universidade Federal de Vicosa

Date submitted: 06 Nov 2015 Electronic form version 1.4