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**Gate-voltage controlled spin pumping effects: spin injection from YIG and Co into metal and graphene based 2 D materials** ALAN KALITSOV, MINT Center, University of Alabama, Tuscaloosa, AL, AL 35487-0209, USA, MAIRBEK CHSHIEV, SPINTEC, UMR (8191) CEA/CNRS/UJF/Grenoble INP, INAC, 17 rue des Martyrs, 38054 Grenoble Cedex, France, OLEG MRYASOV, MINT Center, University of Alabama, Tuscaloosa, AL, AL 35487-0209, USA — Spin current injection into nonmagnetic metals, semiconductors and oxides is crucial component of spintronics. The spin pumping mechanism free from the impedance mismatch is a promising way to inject spin current into nonmagnetic materials [1]. Here we present theory of spin current injected into non-magnetic films which arises from magnetization precession. We apply this theory to two cases (i) insulating yttrium iron garnet ferromagnet/nonmagnetic metal interfaces and (ii) hcp-Co/single layer graphene interface. The electron transport calculations are based on the non-equilibrium Green Function formalism within the tight binding Hamiltonian model [2]. We show that magnitude of the pumped spin current can be efficiently controlled by the gate voltage.

[1] K. Ando, S. Takahashi, J. Ieda, H. Kurebayashi, T. Trypiniotis, C. H. W. Barnes, S. Maekawa and E. Saitoh, Nature Mater. **10**, 655 (2011).
[2] S.-H. Chen, C.-R. Chang, J. Q. Xiao and B. K. Nikolic, Phys. Rev. B **79**, 054424 (2009).

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