Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Giant Perpendicular Magnetic Anisotropy of Graphene-Co Heterostructures[1] HONGXIN YANG, ALI HALLAL, MAIRBEK CHSHIEV, Univ. Grenoble Alpes, INAC-SPINTEC, F-38000 Grenoble, France; CNRS, SPINTEC, F-38000 Grenoble, France; and CEA, INAC-SPINTEC, F-38000 Grenoble, France, SPINTEC THEORY TEAM — We report strongly enhanced perpendicular anisotropy (PMA) of Co films by graphene coating via *ab-initio* calculations.[1] The results show that graphene coating can improve the surface anisotropy of Co film up to twice large of the bare Co case and keep the film effective anisotropy being out-of-plane till 25 Å of Co, in agreement with experiments[2,3]. Our layer resolved analysis reveals that PMA of Co (Co/Gr) films mainly originates from the adjacent 3 Co layers close to surface (interface) and can be strongly influenced by graphene. Furthermore, orbital hybridization analysis uncovers the origin of the PMA enhancement which is due to graphene-Co bonding causing an inversion of Co $3d_{z2}$ and $3d_{x2-y2}$ Bloch states close to Fermi level. Finally, we propose to design Co-graphene heterostructures which possess a linearly increasing surface anisotropy and a constant effective anisotropy. These findings point towards a possible engineering graphene-Co junctions with giant anisotropy, which stands as a hallmark for future spintronic information processing. [1] H. X. Yang, et al. to submit. [2] C. Vo-Van, et al. New J. Phys. 12, 103040 (2010). [3] N. Rougemaille et al. Appl. Phys. Lett. 101, 142403 (2012).

[1]This work was supported by European Graphene Flagship, European Union-funded STREP project CONCEPT-GRAPHENE, French ANR Projects NANOSIM-GRAPHENE and NMGEM

Hongxin Yang
Univ. Grenoble Alpes, INAC-SPINTEC; CNRS, SPINTEC;
and CEA, INAC-SPINTEC, F-38000 Grenoble, France

Date submitted: 13 Nov 2014 Electronic form version 1.4