Graphene covered FePd ferromagnetic electrodes as a platform for perpendicular-2D spin devices

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The $L1_0$-FePd films showed a large perpendicular magnetic anisotropy (PMA) and a low damping constant at room temperature. [1] Graphene has been put forward for PMA platforms as it can induce interfacial PMA owing to orbital-hybridization with magnetic metals. [2] One would like now to explore this foreseen potential for spintronics of a hybrid platform combining reference perpendicular spin-sources with 2D materials. In this study, we report on the large-scale integration of graphene layers with a FePd PMA platform as required for further scaling of spin circuits. $L1_0$-FePd ordered alloy films (t = 20 nm) were formed by r.f. magnetron sputtering and then the graphene layer was integrated on top by a large-scale chemical vapor deposition (CVD). [Fig.1] Structural analyses by X-ray diffraction and magnetic analyses by Kerr microscopy, shows the full preservation of FePd properties during the graphene integration. This scheme provides thus a graphene protected perpendicular spin source with resistance to oxidation, atomic flatness, stable crystallinity, and large perpendicular magnetic properties. This in turns opens the way to the generalization hybrid 2D-materials on optimized PMA platforms, sustaining the development of spintronics circuits using perpendicular spin-sources.

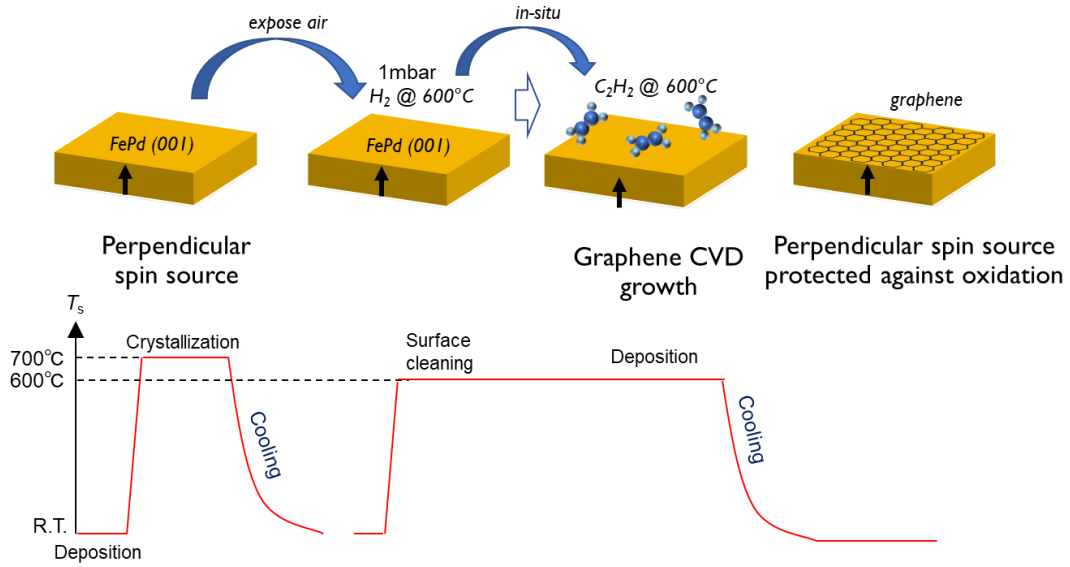

Figure 1 Sketchmatic illustration of the graphene integration process to FePd perpendicular spin source. FePd and graphene layer was grown by r.f. magnetron sputtering and CVD.

References: [1] H. Naganuma *et al.*, Nano Lett. **15**, 623 (2015). [2] H. Yang *et al.*, Nano Lett., **16**, 145 (2016).

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