Departamento de
Física de Materiales

Spin dynamics and magnetotransport in ultra-low damping $Co_{100-x}Fe_x$ layers

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The manipulation of the electron charge and the spin for the development of more efficient spintronic devices has been a topic of increasing interest in recent years. In particular, systems based on metallic ferromagnets with very low damping, a parameter that determines the speed and energy consumption during the operation of modern electronic devices, are excellent candidates for spin current injection. Recently, it has been reported that the $Co_{25}Fe_{75}$ alloy exhibits low magnetic damping, due to the features of the band structure in $Co100_{-x}Fe_x$ alloys. In this talk I will discuss the magnetotransport and spin dynamics in $Co_{100-x}Fe_x$/HM (HM= Pt, Ta) bilayer systems, grown on MgO (100) single crystal substrates. Characterization by Kerr magnetometry, transmission electron microscopy, magnetotransport and ferromagnetic resonance allowed to determine that the $Co_{100-x}Fe_x$ films grow epitaxially with a cubic structure rotated 45° with respect to the (100) direction of the MgO substrate plane, determining the magnetization easy axis. We also investigate the angular dependence of the anisotropic magnetoresistance (AMR) of the epitaxial $Co_{100-x}Fe_x$ films with the applied current parallel and perpendicular to the easy and hard magnetization axes to discuss the magnetization process and to evaluate the tunability of the AMR. Finally, first results on spin transport characterization using spin torque ferromagnetic resonance allowed the detection of induced voltages associated to the conversion of charge current to spin current, demonstrating efficient conversion in Pt layers.

References
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