**Departamento de
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"Influence of interface atomic order on spintronic materials"

The possibility of studying and controlling magnetic oxide interfaces with high degree of precision due to the advances in the deposition techniques, triggered their potential applications in spintronic among other technologies [1,2]. Spintronics is one of the emerging fields for the next-generation nanoelectronic devices to reduce their power consumption and to increase their memory and processing capabilities.

On one hand, transition metal-oxide compounds, for example manganites, are considered a model of strongly correlated electron materials, in which the charge, orbital, and spin degrees of freedom are extremely sensitive to strain and surface symmetry breaking effects. These materials, (i.e. LSMO, LCMO, etc), are applied to obtain junctions for tunnelling magnetoresistance (TMR) but the ratios of TMR are much smaller than expected [1], that could be attributed to a depression of the magnetism near the interfaces between electrodes and the insulating barrier. This behaviour could be related to a modified electronic structure originated from surface-symmetry breaking effects [2].

On the other hand, it has been found that the heavy metal (HM)/ferromagnetic (FM) oxides interface plays an essential role in spintronic devices in the generation and detection of spin currents by means of Spin Hall Effect and Inverse Spin Hall Effect. Spintronic device performance can be significantly enhanced through proper modulation of this interface. Understanding the structure and magnetism of the HM/FM interface is of crucial importance for both the understanding and the improvement of spin current generation

By performing structural and spectroscopic characterization, magnetrotransport measurements and theoretical calculations on systems above mentioned, it is concluded that interface and interdiffusion effects are the dominant mechanisms influencing the value of the magnetic moments which could originate deviation of the bulk magnetization, magnetic proximity effects (MPE) [3] or Anomalous Nernst Effects (ANE) [4]. Atomic-scale defects and intermixing [5, 6] in real samples mean that current theoretical estimates of ~100% injection efficiency in perfect systems remain unattainable. However, by increasing atomic-level structural control of interfaces, a substantial increase in efficiency might be achieved.

[1] S Carreira et al. APPLIED PHYSICS LETTERS 112, 032401 (2018). [2] S Carreira et al. RSC Adv., 2019, 9, 38604. [3] T. Kikkawa, et al J. Appl. Phys. 126, 143903 (2019). [4] R. Ramos, et al Appl. Phys. Lett. 114, 113902 (2019). [5] X. Liang, et al. ACS Appl. Mater. Interfaces 2016, 8, 8175−8183. [6] G. Murgida, A. Barral, J. Perea, A.M. Llois, M.H. Aguirre, PRB submitted 2021.

Miryam Aguirre hizo un doctorado conjunto en UBA-Buenos Aires y en UCM-Madrid. Realizó una estancia postdoctoral en la UCM-Madrid y, posteriormente, en el Instituto de Física aplicada del ETH-Zurich trabajando como asistente docente e investigando aleaciones magnéticas con memoria de forma. En el 2006 consolidó su carrera en el grupo de Química y Física del Estado Sólido de los laboratorios federales EMPA en Zurich con un puesto permanente de investigador "senior". Finalmente, en el 2011 se trasladó a trabajar a España haciendo una estadía de 4 meses en el Instituto de Ciencias Fotónicas de Barcelona y posteriormente incorporándose al Instituto de Nanociencia de Aragón y al dpto. de Física de la Materia Condensada de la Universidad de Zaragoza con un contrato Ramón y Cajal.

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