

Huge thermospin effect in Fe₃O₄/Pt thin film multilayers

M.R. Ibarra^{1,2,3}

¹*Institute of Nanoscience-Aragón, University of Zaragoza, E-50018 Zaragoza, Spain*

²*Department of Physics Condensed Matter, University de Zaragoza, E-50009 Zaragoza, Spain*

³*Laboratory of Advanced Microscopy, University of Zaragoza, 50018 Zaragoza, Spain*

Keywords: Thermospin, Thin films, Magnetic multilayers

Since the discovery of the spin Seebeck effect (SSE) [1] much attention has been devoted to the study of the interaction between heat, spin and charge in magnetic systems. The SSE refers to the generation of spin current upon the application of a thermal gradient and detected by means of the inverse spin Hall Effect (ISHE). The spin Peltier effect (SPE) refers to the generation of a heat current as a result of a spin current induced by the ISHE [2]. Here it is reported the strong enhancement of both effects in Fe₃O₄/Pt multilayered thin films at room temperature [3,4]. This is the results of the pumping effect of magnon and electron spin currents at the ferromagnetic/metal interfaces. These results open the possibility to design thin film heterostructures that may boost the application of thermal spin currents in spintronic.

References:

- [1] K. Uchida, S.Takahashi, K. Harii, J. Ieda, W.Koshibae, K. Ando, S. Maekawa, and E. Saitoh, *Nature* (London) 455, 778 (2008).
- [2] J. Flipse, F. K. Dejene, D. Wagenaar, G. E. W. Bauer, J. Ben Youssef, and B. J. van Wees, *Phys. Rev. Lett.* 113, 027601 (2014).
- [3] Ramos, R.; Kikkawa, T.; Aguirre, M. H.; Lucas, I.; Anadon, A.; Oyake, T.; Uchida, K.; Adachi, H.; Shiomi, J.; Algarabel, P. A.; Morellón, L.; Maekawa, S.; Saitoh, E.; Ibarra, M. R. *Physical Review B*, 99 (22), 220407. 2015.
- [4] K. Uchida, R. Iguchi, S. Daimon, R. Ramos, A. Anadón, I. Lucas, P.A. Algarabel, L. Morellón, M.H. Aguirre, M.R. Ibarra, E. Saitoh. *Physical Review B*, 95, 184437. DOI: 10.1103/PhysRevB.95.184437.