

Observation of an unexpected enhancement of the longitudinal spin Seebeck effect in magnetic multilayers

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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 currents upon the application of a thermal gradient and detected by means of the inverse spin Hall Effect. This effect provides a conceptually new mechanism for thermoelectric energy conversion based on magnetic materials, that may be used for waste heat recovery and temperature control, however the magnitude of the effect is small and routes for increasing the signal are currently being explored. We will report an unexpected enhancement of the SSE voltage in multilayer structures based on Fe₃O₄/Pt thin films at room temperature. This is a consequence of the variation of the conditions for propagation of spin current in the multilayer system, which result in an enhancement of the measured SSE [2]. Our findings open the possibility to design thin film heterostructures that may boost the application of thermal spin currents in spintronic and thermoelectricity.

1. K. Uchida, S. Takahashi, K. Harii, J. Ieda, W. Koshibae, K. Ando, S. Maekawa, and E. Saitoh, *Nature* **455**, 778 (2008)
2. R. Ramos, T. Kikkawa, M. H. Aguirre, I. Lucas, A. Anadón, T. Oyake, K. Uchida, H. Adachi, J. Shiomi, P. A. Algarabel, L. Morellón, S. Maekawa, E. Saitoh, M. R. Ibarra, arXiv:1503.05594