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# Reciprocal relation between spin Peltier and spin Seebeck effects

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In recent times, the interaction between magnetization and heat currents in a magnetic material has gained a renewed interest thanks to the observation of the spin Seebeck effect (SSE) [1,2]. The SSE is the spin counterpart of the Seebeck effect that corresponds to the generation of a pure magnetization current in a magnetic insulator as consequence of a thermal gradient. This is electrically detected by means of the inverse spin Hall effect [3], that rises in a high spin orbit coupling heavy metal deposited on the magnetic insulator. As in the ordinary thermoelectricity, the SSE has its reciprocal effect that is the spin Peltier effect [4,5]. In this work we provide an experimental proof of the reciprocal relations between SSE and SPE [6,7] in a single bulk sample of yttrium iron garnet (YIG) covered by a platinum thin film. For both the SSE and the SPE experiments, we employ a measurement system designed for the detection of heat currents exchanged between the thermal reservoirs and the sample under test. The sample-specific value for the characteristics of both effects measured on the present YIG/Pt bilayer is (6.2 ± 0.4) × 10−3 KA−1 at room temperature, that corresponds to the spin-analogue of the Thomson relation between thermoelectric effects.
[1] Uchida, K. et al. Appl. Phys. Lett. 97, 172505 (2010).
[2] Bauer, G. E. W., Saitoh, E. & van Wees, B. J. Nature materials 391, 11 (2012).
[3] Saitoh, E. et al. Appl. Phys. Lett. 88, 182509 (2006)
[4] Flipse, J. et al. Phys. Rev. Lett. 113, 027601 (2014)
[5] Daimon, S. et al. Phys. Rev. B 96, 024424 (2017)
[6] Basso, V. et al. IEEE Magnetics Letters 9 (2018): 1-4

## Summary

## Topic

1. Nanomagnetism and Spintronics

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