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Temperature Dependence of Lateral magnon spin diffusion in Yttrium Iron Garnet bulk crystals and films[1] BRANDON GILES, Department of Materials Science and Engineering, The Ohio State University, Columbus, OH, ZIHAO YANG, Department of Electrical and Computer Engineering, The Ohio State University, Columbus OH, JOHN JAMISON, ROBERTO MYERS, Department of Materials Science and Engineering, The Ohio State University, Columbus, OH — We present measurements of the spin diffusion length of thermally generated magnons in bulk single crystal and epitaxial films of yttrium iron garnet (YIG). A focused 980 nm laser is used to thermally inject a flux of magnons beneath a Pt absorption pad that is sputter deposited onto YIG bulk single crystals or liquid phase epitaxy films. The thermally injected magnons that diffuse laterally are measured non-locally through an electrically and thermally isolated Pt detection pad via the inverse spin hall effect. Such a configuration allows for an accurate measurement of the spin diffusion length by modeling the decay profile of the lateral spin current as a function of the distance between the excitation laser spot and the detector [1]. The diffusion profiles in bulk and epitaxial YIG films are measured from 10K to 350K. Multidimensional finite element method (FEM) calculations of the magnon diffusion based on hydrodynamic transport equations are used to model the magnon spin diffusion process and determine the temperature dependent magnon spin conductivity.
[1] Giles et al. *PRB* **92,** 224415 (2015).

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Brandon Giles
Department of Materials Science and Engineering, The Ohio State University

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