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Temperature Dependence of the Time-resolved spin-Seebeck Effect: Role of Bulk Magnon Diffusion JOHN JAMISON, ZIHAO YANG, BRANDON GILES, ROBERTO MYERS, The Ohio State University — We present temperature dependent measurements of the time domain waveform of the spin-Seebeck (SSE) effect in platinum/ yttrium iron garnet (Pt/YIG) bilayers. A transient thermal gradient is generated in Pt/YIG by a modulated 980nm laser. The laser, with a rise time of 2 ns is focused onto the Pt surface where it generates a thermal gradient. The thermal gradient generates a flux of spin across the Pt/YIG interface where it is detected as a transverse voltage via the inverse spin Hall effect (ISHE). Using an oscilloscope, we measure the rise and fall times of the ISHE voltage as a function of temperature from 20 to 300 K. The modulation frequency of the laser is such that the ISHE signal is fully saturated, reaching quasi-steady state during the laser pulse, in order to fully capture the rise and fall time. Time domain, 3-D finite element modeling via COMSOL Multiphysics is carried out for the real sample. We correlate the observed time scales in the ISHE signal with materials properties in the Pt/YIG system, wherein the slow rise times are interpreted as diffusion of magnons from the bulk of YIG. Work supported by ARO MURI W911NF-14-1-0016.

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