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Time-domain thermoreflectance of FeRh across magnetic/structural phase transition D.A. WALKO, J. WANG, Advanced Photon Source, Argonne National Laboratory, D.G. CAHILL, University of Illinois, Urbana-Champaign, J.-U. THIELE, E.E. FULLERTON, Hitachi Global Storage Technologies — As FeRh is heated above $\sim 100^\circ$ C, an antiferromagnetic to ferromagnetic phase transition is accompanied by an abrupt expansion in its lattice parameter of $\sim$0.5%. This first-order phase transition has a large temperature hysteresis (often $> 20^\circ$). Ultrafast laser pulses have been shown to heat thin FeRh films through the phase transitions on a picosecond time scale. We have used time-domain thermoreflectance (TDTR) in the temperature range 35 to 160° C to study FeRh films grown on MgO substrates. The TDTR measurements were performed with a mode-locked Ti:sapphire laser; the sample was slightly heated with the near-infrared pump beam, and small changes in the sample's reflectivity were observed with the delayed probe beam using lock-in detection. We used TDTR to measure the thermal conductance of the film/substrate interface. Additionally, the small temperature excursions produced in TDTR allowed us to observe the transient behavior of FeRh at various temperatures across the phase transition. The reflectivity is affected by fast changes in the film's optical properties and in its thickness, and we discuss the effects of hysteresis on the measurement. Work supported by U.S. Department of Energy.

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