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Field and temperature dependence of the first order antiferromagnetic to ferromagnetic phase transition in FeRh thin films STEFAN MAAT, JAN-ULRICH THIELE, ERIC E. FULLERTON, Hitachi Global Storage Technologies — Chemically ordered FeRh exhibits a first order antiferromagnetic (AF) to a ferromagnetic (F) phase transition upon heating from room temperature to above a transition temperature of approximately 370 K. This transition is accompanied by a volume increase of $\sim$1%, a change in resistivity, and a large change in entropy. The phase transition occurs within a few ps allowing it to be used in thermal assisted recording. For example, it was recently proposed to use exchange coupled FeRh/FePt bilayers for thermally assisted magnetic recording media. Here we studied the thermodynamics of the transition in thin FeRh films epitaxially grown onto MgO and sapphire substrates. A shift to lower transition temperatures is observed in external magnetic fields and supercooling is easily observed by cycling either the temperature or the magnetic field. A temperature-field phase diagram was constructed revealing a linear -8 K/ Tesla temperature-field relationship. The observed field dependence of the shift in transition temperature is modeled with an Ising spin type model utilizing a mean field approach. The computational results are in excellent agreement with the experimental data.

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