

Abstract Submitted
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First successful growth of magnetic thin films of meta-stable monoclinic $\text{Gd}_5(\text{Si}_x\text{Ge}_{1-x})_4$ DAVID C. JILES, RAVI L. HADIMANI, Iowa State University, IKENNA C. NLEBEDIM, Iowa State University, Ames Laboratory US DoE, YEVGEN MELIKHOV, Cardiff University, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, IOWA STATE UNIVERSITY TEAM, AMES LABORATORY, US DOE. IOWA STATE UNIVERSITY TEAM, WOLFSON CENTRE FOR MAGNETICS, CARDIFF UNIVERSITY TEAM — We report on the first successful growth of magnetic thin films of the giant magnetocaloric material $\text{Gd}_5(\text{Si}_x\text{Ge}_{1-x})_4$. This material has been widely studied for its unusual properties including the coupled magnetic-structural phase transition. We report on the successful growth of films of $\text{Gd}_5\text{Si}_{2.09}\text{Ge}_{1.91}$ that can be used in micro-cooling applications. The film was grown by Pulsed Laser Deposition (PLD) on a (001) silicon wafer deposited at 200°C from a polycrystalline target. PLD was achieved using a femtosecond laser with a repetition rate of 1kHz, pulse energy of up to 3.5mJ. The deposited film thickness was $\sim 400\text{nm}$ measured using Scanning Electron Microscopy and the composition of the film was analyzed using Energy Dispersive Spectroscopy and found to be close to the target composition. Magnetic measurements were carried out in a SQUID magnetometer. Magnetic moment vs. magnetic field measurement confirmed that the film was ferromagnetic at 200K. The transition temperature of the film was measured from magnetic moment vs. temperature measurements using inflection point. Transition temperature was measured at 280K which was close to the 1st order phase transition temperature of bulk material.

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