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Magnetic Properties of Single Crystal $Fe_{1-x}Ga_x$ Thin Films ADAM MCCLURE, HONGYAN LI, PAUL RUGHEIMER, Montana State University, J.X. CAO, RUQIAN WU, University of California, Irvine, ELKE ARENHOLZ, Lawrence Berkeley National Laboratory, YVES IDZERDA, Montana State University — Single crystal thin films of the highly magnetostrictive $Fe_{1-x}Ga_x$ alloy have been prepared on GaAs(001), with a ZnSe buffer layer, and MgO(001) substrates by molecular beam epitaxy (MBE). The saturation magnetization of the samples, as determined by vibrating sample magnetometry (VSM) and Rutherford backscattering (RBS), shows a reduction as a function of Ga concentration which closely follows a simple dilution model up to a concentration of 25% Ga where the magnetization falls more abruptly than simple dilution allows. X-ray magnetic circular dichroism (XMCD) performed at the Fe and Ga L_{2,3}-edges, along with *ab-initio* density functional (GGA) calculations, ascribe this trend to a decrease in the elemental Fe moment and an induced moment in the gallium of 0.1 μ_B anti-aligned to the Fe, establishing Fe_{1-x}Ga_x as a ferrimagnetic system.

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