

Abstract Submitted
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Deposition and characterization of highly spin-polarized $\text{Co}_{1-x}\text{Fe}_x\text{S}_2$ thin films.¹ MICHAEL MANNO, C. LEIGHTON, University of Minnesota — Many spintronic devices could benefit from the use of a highly spin polarized ferromagnet. We have recently demonstrated tunable spin polarization of $-56 < P < +85$ % by composition control of the Fermi level in bulk $\text{Co}_{1-x}\text{Fe}_x\text{S}_2$ [1]. Although this material offers great promise for fundamental studies of spintronic devices, integration in devices such as spin injectors requires deposition of thin films. We present here synthesis details, structural, electronic, and magnetic properties of polycrystalline $\text{Co}_{1-x}\text{Fe}_x\text{S}_2$ films successfully fabricated by *ex-situ* sulfidation on Al_2O_3 (0001), SrTiO_3 (001), and GaAs (001). The synthesis involves exposure of sputter or MBE deposited Co and Co-Fe alloy films to a S atmosphere at various reaction temperatures. Significant reaction with S occurs only above 200 C, while at 350 C and above we observe single-phase CoS_2 XRD patterns, and S contents (from EDS) of 65-70 %. The conversion process has been studied in detail using multiple probes. Optimal conditions produce films that are ferromagnetic with the bulk T_C , bulk magnetization, metallic transport, and the expected magnetotransport phenomena. [1] L. Wang et al., Phys. Rev. B. **73** 144402 (2006).

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