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Composition-controlled spin polarization in $Co_{1-x}Fe_xS_2$ LAN WANG, KOICHIRO UMEMOTO, RENATA WENTZCOVITCH, University of Minnesota, TINGYONG CHEN, CHIA-LING CHIEN, John Hopkins University, JOE CHECKELSKY, JAMES ECKERT, Harvey Mudd College, E. DAN DAHBERG, CHRIS LEIGHTON, University of Minnesota — We demonstrate the successful application of a simple scheme to allow for composition control over the spin polarization of the alloy $Co_{1-x}Fe_xS_2$. The Fe doping concentration can be used to fine-tune the position of the Fermi level in $Co_{1-x}Fe_xS_2$ leading to control over both the sign and magnitude of the spin polarization. We have combined detailed electronic structure calculations, point contact Andreev reflection, conventional magnetometry, calorimetry, and various modes of magnetotransport (including anisotropic magnetoresistance), to assimilate a consistent picture of the evolution of the spin polarization (P) with composition. Spin polarizations in the range –57 % $<$ P $<$ 85 % have been achieved. We suggest that this material could be employed as a tunable source of highly polarized electrons for fundamental studies of spin-electronics.

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