Abstract Submitted
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Magnetic and electron-transport properties of spin-gapless semiconducting CoFeCrAl films.[1] DAVID SELLMYER, YUNLONG JIN, University of Nebraska Lincoln, PARASHU KHAREL, South Dakota State University, SHAH VALLOPPILLY, TOM GEORGE, BALAMURUGAN BALASUBRAMANIAN, RALPH SKOMSKI, University of Nebraska Lincoln — Recently, spin-gapless semiconductors (SGS) with a semiconducting or insulating gap in one spin channel and zero gap in the other at the Fermi level have attracted much attention due to their new functionalities such as voltage-tunable spin polarization, the ability to switch between spin-polarized n-type and p-type conduction, high spin polarization and carrier mobility. For the development of spintronic devices utilizing SGS, it is necessary to have a better understanding of the magnetic and transport properties of the thin films of these materials. In this study, the structural, magnetic, and electron-transport properties of a SGS material CoFeCrAl in the thin film geometry have been investigated. CoFeCrAl films were grown on atomically flat SiO2 substrates using magnetron sputtering. The Curie temperature was measured to be 550 K very close to the value reported for bulk CoFeCrAl. Electron-transport measurements on the oriented films revealed a negative temperature coefficient of resistivity, small anomalous Hall conductivity and linear field dependence of magnetoresistance, which are transport signatures of SGS. The effect of elemental compositions and structural ordering on the SGS properties of the CoFeCrAl films will be discussed.

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