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Magneto-Resistance in thin film boron carbides ELENA ECHEVERRIA, University of Nebraska-Lincoln, GUANGFU LUO, University of Nebraska at Omaha, J. LIU, University of Nebraska-Lincoln, WAI-NING MEI, University of Nebraska at Omaha, F.L. PASQUALE, University of North Texas, J. COLON SANTANTA, P.A. DOWBEN, LE ZHANG, University of Nebraska-Lincoln, J.A. KELBER, University of North Texas — Chromium doped semiconducting boron carbide devices were fabricated based on a carborane icosahedra ($B_{10}C_2H_{12}$) precursor via plasma enhanced chemical vapor deposition, and the transition metal atoms found to dope pairwise on adjacent icosahedra site locations. Models spin-polarized electronic structure calculations of the doped semiconducting boron carbides indicate that some transition metal (such as Cr) doped semiconducting boron carbides may act as excellent spin filters when used as the dielectric barrier in a magnetic tunnel junction structure. In the case of chromium doping, there may be considerable enhancements in the magneto-resistance of the heterostructure. To this end, current to voltage curves and magneto-transport measurements were performed in various semiconducting boron carbide both in and out plane. The I-V curves as a function of external magnetic field exhibit strong magnetoresistive effects which are enhanced at liquid Nitrogen temperatures. The mechanism for these effects will be discussed in the context of theoretical calculations.

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