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A transition in the magneto-transport in the $L1_0$ MnAl thin films[1]

LINQIANG LUO, JIWEI LU, NAM DAO, YISHEN CUI, STUART A. WOLF, Univ of Virginia — In this talk we will report on $L1_0$ MnAl thin films with perpendicular magnetic anisotropy prepared on single crystal MgO substrates by co-sputtering Mn and Al targets. A Cr seeding layer enabled the epitaxial growth of the MnAl films. The magneto-resistance (MR) of these films was measured using a Hall bar structure. When the external magnetic field was applied perpendicular to the thin film surface, a change of the sign of MR was observed as will be discussed below. Above 175K, a negative magnetoresistance was observed with two maxima occuring at the coercivity fields of the MnAl thin films. Below 175K, the MR became positive, and the MR ratio increased with decreasing temperature. The possible mechanisms for the transition in the MR will be discussed in detail in this talk. They include the effects of inhomogeneity, chemical ordering and the underlying domain structure.

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Linqiang Luo
Univ of Virginia

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