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Anomalous transport properties of $Ni_2Mn_{1-x}Cr_xGa$ Heusler alloys at the martensite-austenite phase transition JEFFREY BROCK, MAHMUD KHAN, Miami Univ — The Heusler alloy Ni_2MnGa exhibits a first order martensitic phase transition at $T_M \approx 202$ K. During this transition, the high temperature cubic $L2_1$ phase (austenite) of the alloy transforms to a low temperature phase (martensite) with a lower symmetry. In both stoichiometric and off-stoichiometric Ni_2MnGa based materials, jump-like anomalies are observed in the resistivity versus temperature data in the vicinity of T_M. The magnitude of the jump has been reported to vary from less than 1% to a few percent. This variation in the magnitude of resistivity change has been attributed to the difference in scattering on the vibrational motion of the lattice between the austenitic and martensitic phases and the reconstruction of the electronic structure. Although, several reports can be found in existing literature that discuss the change of resistivity of Heusler alloys at MPT, detailed study of a complete system that shows a systematic change of resistivity at MPT is missing. Here we report an experimental study on a series of $Ni_2Mn_{1-x}Cr_xGa$ Heusler alloys. A detailed study has been performed on this previously unexplored system by magnetization and transport measurements. Sharp step-like anomalies are observed in the resistivity data of the alloys, in the vicinity of the T_M, that changes dramatically with increasing Cr concentration. The magnitude of the jump in resistivity changes dramatically from less than 1 % to nearly 18 %. The results provide a further understanding of the mechanisms that may cause the change in resistivity in the vicinity of MPT.

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