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Epitaxial Growth and Properties of Multilayers Containing $(CoMn)_{0.1}Ge_{0.9}$and Ge (001)[1] LIANG HE, CHARLES MALMBERG, BRIAN COLLINS, FRANK TSUI, University of North Carolina at Chapel Hill — Epitaxial growth and magnetic and magnetotransport properties of superlattices containing Co and Mn codoped Ge magnetic semiconductor layers with Ge (001) interlayers have been studied. Layer-by-layer epitaxial growth has been observed during the deposition of the doped magnetic semiconductor layers, i.e. $(CoMn)_{0.1}Ge_{0.9}$, and that of the undoped Ge interlayers, as indicated by persistent oscillations in the intensity and width of reflection high energy electron diffraction. The superlattices exhibit a ferromagnetic transition near 100 K and superparamagnetism at higher temperatures, as determined by temperature and field dependent magnetic measurements using SQUID magnetometry. Magnetotransport properties indicate that the superlattices are p-type semiconductors with very large positive magnetoresistance (MR) and anomalous Hall effect (AHE). Conduction at low temperatures (<10 K) is dominated by variable range hopping in the impurity band. Below 100 K, the MR is found to scale with square of the magnetization, whereas the AHE exhibits a linear dependence on magnetization. Above 100 K, in the superparamagnetic regime the magnetotransport parameters scale with magnetic field.

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