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Influence of carrier type on the ferromagnetism in $Ge_{1-x}Mn_x$ thin films WENJING YIN, JIWEI LU, LI HE, JIANI YU, WENBIN FAN, ROBERT HULL, STUART WOLF, University of Virginia — We have been studying the magnetic and transport properties of Mn doped Group IV semiconductors. Mn ions have been implanted into both boron doped P type and phosphorus doped N type Ge thin films respectively. A ferromagnetic hysteresis loop has been observed in P type samples at low temperatures and supermagnetism remains strong at 300 K. The P type samples show much stronger ferromagnetism than N type samples. At 5K, the ferromagnetic saturation moment (Ms) of 5% Mn doped p-Ge sample is $\sim$0.65 Bohr magneton per Mn, which is almost twice as much as that of the 5% Mn doped n-Ge. Rapid thermal annealing has been used to reduce the ion implantation damage as well as to help Mn ions to incorporate into Ge lattice. In this talk we will present magnetic, transport and electron microscopy characterization of these samples. We are in the process of trying to understand the nature of the ferromagnetism in these films and its correlation to carrier type.

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