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**Ferromagnetism in Mn doped Ge thin films** JIANI YU, JIWEI LU, KEVIN WEST, LI HE, ROBERT HULL, STU WOLF, University of Virginia, MATERIAL SCIENCE AND ENGINEERING, UNIVERSITY OF VIRGINIA TEAM — Exploring ferromagnetism in Group IV semiconductors is of great interest due to their potential application to spintronics. In this presentation, we discuss the ferromagnetism induced in thin Ge films by  $\text{Mn}^+$  ion implantation as well as the correlation between their magnetism and their transport properties. The as-received Germanium on insulator (GOI) wafer consists of 200nm of (100) oriented Ge on 400nm of oxide both on a Si wafer. Mn ions were implanted at 300 °C into the Ge layer at 200 KeV. The ferromagnetism has been observed in Ge with a range of Mn concentration from 0.5 to 2 atom %. The sample with 2 % Mn doping has a Curie temperature near 300K and has a moment of  $\sim 0.7 \mu_B/\text{Mn}$  at 10 K. Transmission electron microscopy (TEM) reveals the formation of second phase clusters of which are probably responsible for the majority of the magnetism in this sample. In contrast, the 0.5 % and 1 % Mn as implanted Ge thin films behave like diluted ferromagnetic semiconductors, both have Curie temperatures is around 100 ~150 K and the 0.5% sample doesn't show TEM evidence of a second phase. Our data indicates that the transport properties of Mn doped Ge correlates with the magnetism.

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