

MBE Growth and Unique Properties of MnGeP₂ and FeMn Thin Films

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A new magnetic semiconductor, MnGeP₂, whose crystal structure is chalcopyrites and “genealogically” related to the more familiar tetrahedrally-coordinated zinc-blende, was grown on GaAs(100) substrate using MBE (molecular beam epitaxy). In this talk I will present the magnetic and electrical properties of MnGeP₂ thin film. It exhibited ferromagnetism with $T_C = 320$ K and a magnetic moment per Mn at 5K of $2.58 \mu_B$. On the other hand, it has been well known that fcc γ -Fe_{1-x}Mn_x ($0.1 < x < 0.6$) alloys has antiferromagnetic ordering at $T_N = 540$ K, which is widely used as pinning layer in various spin devices. Here we report a new crystal phase, i.e. α -Mn phase, of epitaxial Fe_{0.5}Mn_{0.5} thin film grown on GaAs(100) substrate. Interestingly, it shows ferrimagnetic ordering at 750 K. The magnetic moment per Fe atom is $> 3 \mu_B$ and the coercivity field is 363 Oe at 5 K.