

Beta-detected NMR Study of the Local Magnetic Field in Epitaxial GaAs:Mn

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A low energy beam of spin polarized $^8\text{Li}^+$ has been employed to study the magnetic field distribution in an epitaxial thin film of 5.4% Mn doped GaAs(180nm) on an undoped GaAs substrate via beta-detected NMR. The spectrum is a strong function of the implantation energy in the range 28 keV to 2 keV. A broad resonance, negatively shifted from the narrow substrate resonance, corresponds to Li in the Mn doped layer. The spin lattice relaxation rate is also much faster in the Mn doped layer than in the substrate. Surprisingly, the sharp peak characteristic of nonmagnetic GaAs, is observed down to the lowest implantation energy, for which none of the Li should reach the substrate. We discuss this observation in relation to possible chemical (Mn out-diffusion) and magnetic phase separation.

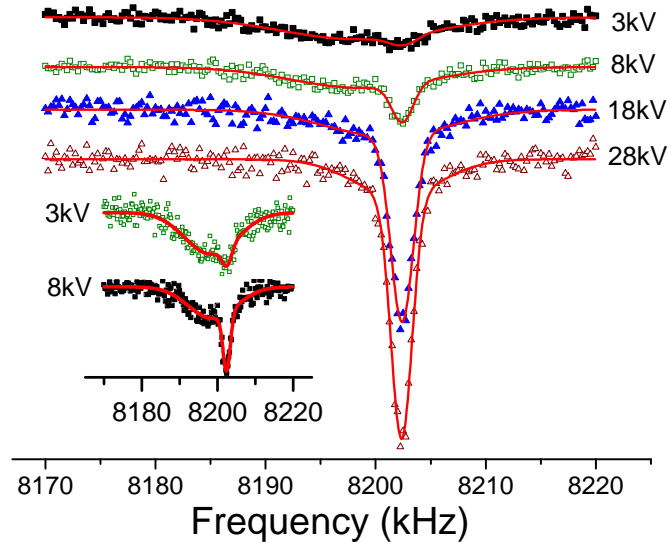


Fig. 1: Implantation energy dependence of the pulsed β NMR spectrum at 50 K, below the Curie temperature (72 K). The narrow resonance is characteristic of the pure GaAs substrate.