

Structural Properties of Ferromagnetic GaMnAs Layers

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Thin layers of ferromagnetic GaMnAs, prepared by MBE under various conditions, were examined by X-ray diffraction and reflection. Preparation of samples was performed by low temperature (LT) growth (200-250°C) using both As₄ and As₂ molecular beams at various As/Ga ratios. Subsequently, samples were annealed in order to optimize their transport properties and to enhance their Curie temperature.

To determine the structural parameters high resolution X-ray diffraction measurements and reciprocal space mapping close to the symmetrical (002), (004) and asymmetrical (224) Bragg reflections as well as specular and diffuse scattering measurements close to the (000) reflection were performed. The combination of different X-ray scattering techniques allows more complete characterization of the samples.

Structural and compositional parameters of the samples (strain, lattice constant, Mn concentration, As nonstoichiometry, defects, inhomogeneity) were evaluated and discussed in relation with their galvanomagnetic properties and preparation conditions.

This work was supported by the Institute of Physics' Institutional Research Plans Nos. AV0Z10100520 and AV0Z10100521 and by the Grant Agency of the Czech Republic, grant No. 202/04/1519.

Keywords: magnetic semiconductors, high resolution x-ray diffraction, epitaxial thin layers