

Structure and magnetism of MnGa epilayers on GaAs(111)B

A. W. Arins, H. F. Jurca, J. Zarpellon, I. L. Graff, W. H. Schreiner, J. Varalda, and D. H. Mosca¹

¹*Laboratório de Superfícies e Interfaces, Universidade Federal do Paraná, C. P. 19044 81531-990 Curitiba PR, Brazil*

MnGa alloys with compositions in the range of 52.5 to 60.0 at. Mn were grown by molecular beam epitaxy on GaAs(111)B substrates. High quality epilayers were obtained at growth temperatures between 25 and 250 Celsius. Epilayers are fully-stabilized by post-growth annealing at 400 Celsius during 30 minutes. Reflection high energy electron diffraction and X-ray diffraction measurements have show that MnGa layers are formed by stacking of (111) planes of tetragonal zinc-blende structure (ZB) which are rotated by approximately 11 degrees with respect to the underlying (111) planes of the GaAs lattice. The tetragonal ZB structure of MnGa has lattice parameters $a = 0.55$ nm and $c = 0.61$ nm, exhibiting a net magnetic moment of 1.53 Bohr magneton per Mn atom. The hysteresis loops are narrow, implying that the applied magnetic field necessary to reverse the magnetization is relatively low. The heteroepitaxy of these alloys on GaAs is an interesting approach to develop devices for semiconductor spintronics.