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Variation of exchange interactions and magnetism with uniaxiality in MnAs thin films MAGNUS WIKBERG, Dep. Eng. Sciences, Uppsala University, RONNY KNUT, SUMANTA BHANDARY, Dep. Physics and Material Science, Uppsala University, MIKAEL OTTOSON, Dep. of Materials Chemistry, Uppsala University, JANUSZ SADOWSKI, MAX-lab, Lund University, OLOF KARIS, BIPLAB SANYAL, Dep. Physics and Material Science, Uppsala University, PETER SVEDLINDH, Dep. Eng. Sciences, Uppsala University — The magnetic behavior of high quality MnAs thin films grown on GaAs(100) substrates by means of molecular beam epitaxy has been studied. The correlation between structural parameters such as film strain and orientation distribution of the MnAs hexagonal unit cell and the magnetic anisotropy and the ferromagnetic ordering temperature has been investigated. Uniaxially oriented and relaxed films display a transition temperature (T_c) and anisotropy constants (K_1/K_2) close to bulk MnAs values while strained MnAs films show T_c) and K_1/K_2 values clearly deviating from the corresponding bulk values. The experimental findings from magnetic (SQUID magnetometry), structural (XRD) and element specific magnetic (X-ray magnetic circular dichroism) measurements have been complemented by theoretical calculations (full potential linearized muffin tin orbital method in the local spin density approximation) of the change of exchange and anisotropy energies with strain in the unit cell.

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