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Competition between cubic and uniaxial magnetic anisotropy in GaMnAs at low Mn concentrations L.V. TITOVA, M. KUTROWSKI[1], X. LIU, R. CHAKARVORTY, W.L. LIM, T. WOJTOWICZ[2], J.K. FURDYNA, M. DOBROWOLSKA, University of Notre Dame — We study the dependence of the cubic and uniaxial magnetic anisotropy terms in GaMnAs on hole concentration p and temperature T. The $Ga_{0.99}Mn_{0.01}As$ layers were grown on ZnSe buffers deposited on GaAs substrates, and co-doped by Be in the range $3.0x10^{19} < p < 8.5x10^{19}cm^{-3}$. Due to small lattice mismatch the uniaxial and cubic anisotropy terms in these samples were comparable. The magnetic anisotropy was studied by polar magneto-optical Kerr effect, which allowed us to monitor the easy axis of magnetization. The results showed that the cubic anisotropy is highly sensitive to both p and T. Specifically, in samples with high p the cubic anisotropy term is dominant at low T, but decreases rapidly as T increases. In sharp contrast, uniaxial anisotropy shows a much weaker dependence on p and T, thus dominating at temperatures close to T_C even in samples with high p. These results open the possibility of engineering magnetic anisotropy and the magnetization reversal process in GaMnAs by controlling $T$and/or p.

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