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Stoichiometric growth of high Curie temperature heavily-alloyed GaMnAs[1] S. MACK, R.C. MYERS, J.T. HERON, A.C. GOSSARD, D.D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara, CA 93106 — Previous work indicates that single-phase, high-Mn incorporation ($\geq$9%) in GaAs can be obtained via MBE at very low substrate temperatures with film thicknesses on the order of a few nanometers. Here we present the properties of smooth, single-crystalline GaMnAs samples with Mn densities between 9 and 18% and continuously tuned arsenic stoichiometry using a combinatorial, non-rotated growth method.[1] Systematic, reproducible thick films (100 nm) display optimal magnetic, electronic, and structural properties in a narrow band of As:Ga flux ratios at the stoichiometric condition, where the Curie temperature is maximum. Post-growth annealing increases the Curie temperature while lowering the lattice constant, indicating that Mn interstitials are the dominant compensating defect in high-Mn containing GaMnAs. Curie temperatures from many samples grown with varying conditions all reach a maximum near the previously reported maximum ($\sim$165K).
[1] R. C. Myers *et al.*, Physical Review B 74, 9 (2006).

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