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Prospects for high temperature ferromagnetism in (Ga,Mn)As semiconductors JAIRO SINOVA, Texas A&M University, T. JUNGWIRTH, J. MASEK, N.A. GONCHARUK, Institute of Physics ASCR, Czech Republic, K.Y. WANG, K.W. EDMONDS, A.W. RUSHFORTH, R.P. CAMPION, L.X. ZHAO, C.T. FOXON, B.L. GALLAGHER, U. of Nottingham, A.H. MACDONALD, U. of Texas, M. POLINI, NEST-INFM, Pisa, M. SAWICKI, Polish Academy of Science, J. KOENIG, Ruhr-Universitat — We report on a comprehensive combined experimental and theoretical study of Courie temperature trends in (Ga,Mn)As ferromagnetic semiconductors. Broad agreement between theoretical expectations and measured data allows us to conclude that T_c in high-quality metallic samples increases linearly with the number of uncompensated local moments on Mn_{Ga} acceptors, with no sign of saturation. Room temperature ferromagnetism is expected for a 10% concentration of Mn_{Ga}. Based on the analysis of magnetotransport and magnetization data we find no fundamental obstacle to substitutional Mn_{Ga} doping in high-quality materials beyond our current maximum level of 6.8%, although this achievement will require further advances in growth control. Modest charge compensation does not limit the maximum T_c possible in ferromagnetic semiconductors based on (Ga,Mn)As. Ref: Jungwirth et al. Phys. Rev. B 72, 165204 (2005).

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