

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Relation between structural, electronic, and magnetic properties in ferromagnetic (Ga,Fe)N A. BONANNI, C. SIMBRUNNER, T. LI, M. WEGSCHEIDER, M. QUAST, A. NAVARRO-QUEZADA, Institute for Semiconductor and Solid State Physics, University of Linz, Austria, M. KIECANA, M. SAWICKI, H. PRZYBYLINSKA, R. JAKIELA, T. DIETL, Institute of Physics, Polish Academy of Sciences, Warsaw, Poland — In order to shed light on the origin of high temperature ferromagnetism observed in magnetically doped semiconductors and oxides, we have undertaken comprehensive studies of MOCVD grown (Ga,Fe)N, which combine a detailed space-resolved chemical analysis by TEM and EDS with a thorough magnetic, optical, and electric characterization. Our results, partly presented in cond-mat/0612200, reveal the presence of coherent nanocrystals, presumably Fe_xN , with the composition and lattice parameter imposed by the GaN host. Their presence and their non-uniform distribution over the film volume affect in a decisive way the magnetic, optical, and transport properties of the films. We find, in particular, ferromagnetic signatures such as spontaneous magnetization, which persist well above room temperature and whose magnitude increases with the Fe concentration above the solubility limit. We explain these observations in terms of a high blocking temperature associated with magnetic- and shape-anisotropy of the Fe_xN nanocrystals.

A. Bonanni

Date submitted: 29 Dec 2006

Electronic form version 1.4