Contribution ID: **25** Type: **Accepted**

Direct identification of interstitial Mn in Ga1−xMnxAs and evidence of its high thermal stability

Wednesday 8 December 2010 15:10 (20 minutes)

The lattice location of Mn in GaAs has been intensively studied in recent years due to its crucial role on the magnetic properties of Ga1−xMnxAs, one of the most studied dilute magnetic semiconductors. Maximum Curie temperatures (TC) are usually achieved after low temperature annealing (˜200°C), which is generally attributed to out-diffusion of interstitial Mn (MnI). However, despite major developments in film quality, the TC of Ga1−xMnxAs remains below room temperature even at very high Mn concentrations.
We report on the study of the lattice location of Mn in Ga1−xMnxAs by means of electron emission channeling from the decay of implanted 56Mn produced at ISOLDE/CERN. In addition to Ga1−xMnxAs thin films with x = 0.01 and x = 0.05, we have studied intrinsic GaAs, p+-GaAs and n+-GaAs. We locate the majority of the implanted Mn atoms in substitutional Ga sites and a significant fraction in tetrahedral interstitial sites with As nearest neighbors. Contrary to the general belief that interstitial Mn out-diffuses at ~200°C [1], we give evidence of its high thermal stability up to 400°C. Showing that MnI is immobile up to temperatures where phase segregation is known to occur, we discuss strategies and prospects for achieving room temperature ferromagnetism in Ga1−xMnxAs.

Author: PEREIRA, Lino (IKS KU leuven)

Co-authors: VANTOMME, A. (IKS-KU Leuven); ARAUJO, J.P. (IFIMUP/IN Porto); CORREIA, Joao (ITN); DA SILVA, M.R. (University of Lisbon); WAHL, Ulrich (ITN)

Presenter: PEREIRA, Lino (IKS KU leuven)

Session Classification: Solid State I