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ION IMPLANTATION AS A TOOL FOR THE SYNTHESIS OF MAGNETIC SEMICONDUCTORS

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Interest in magnetic semiconductors has received great attention due to the recently demonstrated capability of manipulating electronic spins in semiconductor devices, which leads to the possibility of reading and writing non-volatile information through magnetism. A potentially important material for this application is Mn doped GaAs prepared by low temperature MBE. The Curie temperature in such material is directly related to the Mn content, and therefore high Mn contents are desired. Here we describe our initial results regarding the use of ion implantation and rapid thermal annealing to prepare GaAs:Mn as a potential tool for producing magnetic semiconductors. Implantation is carried out using a MEVVA ion source, and GaAs with doses between 10^{15} and 10^{17} cm⁻² are prepared and thermally processed. As-implanted and annealed materials are characterized by transmission electron microscopy to determine the microstructure and by synchrotron-based techniques to determine the structural, magnetic and electronic properties.

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