



Contribution ID: 416

Type: Poster Presentation

Magnetic behavior of Ar implanted ZnO

Our research is driven by the goal to realize ferromagnetism at room temperature on non-magnetic materials such as semiconductors, among other materials. If realized, semiconductor functionality should coexist with ferromagnetism, ideally above room temperature (practical operating temperatures). In our work, ZnO single crystals implanted with 45 keV ^{40}Ar ions up to fluences of 4.5×10^{15} ions/cm² were selected as a system of interest. Emission Mössbauer Spectroscopy (eMS) measurements were then carried out on the samples following implantation with $^{57}\text{Mn}^*$ radioactive ion beams, which decay to the Mössbauer atom ^{57}Fe via β^- decay. Radioactive ion beams were produced at the ISOLDE facility, at CERN, through a fission reaction induced by 1.4 GeV protons on a ^{235}U target, followed by a multi-stage laser ionization and mass separation by pure magnets. Two sets of measurements were carried out: (a) Temperature series measurements on the as-implanted sample and on another Ar implanted ZnO sample following annealing at 400 °C in vacuum for 15 minutes, and (b) Angle dependence measurements on the annealed sample, in the presence of an external magnetic field. Temperature dependence measurements show strong magnetic features in the spectrum, with the magnetic field not dependent on the temperature, thus paramagnetism instead of ferromagnetism. Paramagnetism is further confirmed by the angle dependence of magnetic sextet lines in each spectrum. A comparison and discussion of results obtained will be presented.

Apply for student award at which level:

PhD

Consent on use of personal information: Abstract Submission

Yes, I ACCEPT

Primary author: MASONDO, Vusumuzi (Durban University of Technology)

Co-authors: Prof. BHARUTH-RAM, Krish (Durban University of Technology); Prof. RONNING, Carsten (University of Jena); Dr MASENDA, Hilary (University of the Witwatersrand); Dr GUNNLAUGSSON, Heraldur (University of Iceland); Ms MPATANI, Ongeziwe (University of the Witwatersrand); Dr LISEMA, Lehlohonolo (University of the Witwatersrand); Dr DLAMINI, Sanele (Durban University of Technology); Dr MOLHOLT, Torben (DTU Health Technology); Prof. NAIDOO, Deena (University of the Witwatersrand); Dr HEINIGER-SCHELL, Juliana (CERN); Dr QI, Bingcui (University of Iceland); Dr KRASTEVA, Petko (Institute for Nuclear Research and Nuclear Energy); Dr OLAFSSON, Sveinn (University of Iceland)

Presenter: MASONDO, Vusumuzi (Durban University of Technology)

Session Classification: Poster Session

Track Classification: Track A - Physics of Condensed Matter and Materials