After more than a decade of extensive research on the magnetic order triggered by lattice defects in a wide range of nominally non-magnetic materials [1], we report its application in a spintronic device. The device presented in this work is based on a spin-filter phenomenon we have discovered at the interfaces between defect-induced magnetic regions, produced at the surface of a Li-doped ZnO nanostructure by low-energy proton implantation [2], and non-magnetic regions. Giant positive magnetoresistance in some cases larger than 500% at 300 K and magnetic fields ~100 Oe has been observed. The effect scales with the number of interfaces introduced along the surface of the nanostructure and depends on the implantation dose. By modelling the transport through the magnetic/non-magnetic interfaces, the magnetic exchange coupling strength between localized magnetic defects is obtained.


Keywords: defect induced magnetism, Oxides, ion irradiation

Presenting author’s email: esquin@physik.uni-leipzig.de