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Low temperature magnetotransport study of pulsed laser deposited $\text{Mg}_{0.15}\text{Zn}_{0.85}\text{O}$ film

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The possibility of manipulation of electron spin or spin polarized current is a key issue for examining the utility of the material in making spintronic devices. The presence of the spin polarized current can be evident from the magnetotransport/magnetoresistance study of the material. In view of this, the present paper deals with the magnetotransport properties of Mg doped ZnO film prepared by pulsed laser ablation technique. Quite interestingly, we observe both negative as well as positive magnetoresistance (MR) in the MgZnO film. The decreasing behaviour of resistance with increasing temperature reveals the semiconducting nature of film. The presence of negative MR was described on the basis of localized magnetic moments which are provided by the magnetically active defect like oxygen and zinc interstitials while the positive MR was described by two band model where the applied magnetic field induces changes in the relative populations in the two conduction bands with different conductivities. At 7K temperature, a change in sign of MR from negative to positive has been observed revealing the presence of spin polarization of charge carriers in the film. The response of the material to the magnetic fields can be monitored by intentional introduction of Oxygen or zinc interstitials, by varying the temperature or magnetic field and this property can be exploited in making spintronic devices.

Biography

Tanveer A Dar received MSc degree in Physics from Barkatulla University, Bhopal, MP, India and pursued MPhil (Physics) with special focus on material science from Devi Ahilya University, Indore India. Currently, he was enrolled as a PhD student in school of Physics Devi Ahilya University Indore, under the supervision of Prof. (Mrs.) Pratima Sen. His area of research include electronic and spin transport in Diluted magnetic semiconductor surfaces and Interfaces and coauthored about 7 papers in international reputed journals.

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