

Abstract Submitted
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Carrier Mediated Ferromagnetism above 300 K in ZnO:Mn¹

NIKOLETA THEODOROPOULOU, VINITH MISRA, JAGADEESH MOODERA, Francis Bitter Magnet Lab, MIT, BISWARUP SATPATI, Institute of Physics, Bhubaneswar, India — We will present evidence that $Zn_{1-x}Mn_xO$ thin films, grown by reactive magnetron sputtering, are ferromagnetic at temperatures significantly above 300 K. The onset of the ferromagnetic behavior is sensitive to the exact growth conditions - in addition to the Mn concentration, the magnetic properties strongly depended on the substrate type, film growth temperature and Oxygen partial pressure. Anomalous Hall Effect shows that the charge carriers are spin-polarized electrons, participating in the observed ferromagnetic behavior. Specifically, $Zn_{1-x}Mn_xO$ on $Al_2O_3(0001)$ substrates are single-phase, as characterized by XRD and TEM and the magnetic moment for a Mn concentration of $x=0.03$ is $4.8\mu_B/Mn$ at 350 K, one of highest moments yet reported for any Mn doped magnetic semiconductor. Growth of $Zn_{1-x}Mn_xO$ films on Si/SiO₂ substrates leads to the formation of secondary phases and no ferromagnetism is observed in these cases.

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