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Room temperature ferromagnetism in Mn and Fe-doped indium-tin oxide films J.M.D. COEY, CRANN and School of Physics, Trinity College, Dublin 2. Ireland, R.D. GUNNING, M VENKATESAN, MANSE TEAM — Following the reports of high temperature ferromagnetism in n-type Mn-doped Indium tin oxide (ITO) thin films, we have undertaken a systematic investigation of the magnetic and transport properties of ITO thin films doped with all the 3d transition metal ions. ITO films were grown on c-cut sapphire substrate by pulsed laser deposition. The X-ray diffraction patterns reveal that they are oriented mainly in (111) direction of cubic bixbyite structure. Undoped ITO films are diamagnetic. Room temperature ferromagnetism is observed in Fe and Mn-doped thin films of varying concentrations, when deposition temperatures are greater than 600 ° C. The largest magnetic moments were found in 2.5% Mn-doped and 7.5% Fe-doped ITO films. The Mn-doped films are anhysteretic, while the Fe-doped films exhibit a hysteresis with a coercivity of 30 mT and a moment which increases with concentration. However, in the Mn-doped samples, we see a higher moment for the lower concentrations. None of the other doped ITO films were found to be magnetic, ruling out the possibility of cluster based magnetism. Conversion electron Mössbauer spectra of the ferromagnetic iron-doped films show the presence of magnetite in quantities sufficient to explain the magnetization. No such secondary phase is found for Mn.

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