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Electrical transport and magnetic properties of sputtered Co-doped indium-tin oxide films JOLANTA STANKIEWICZ, ICMA, CSIC-Universidad de Zaragoza, FRANCISCO VILLUENDAS, Departamento de Fisica Aplicada, Universidad de Zaragoza — We report results of electrical resistivity, Hall effect and magnetization measurements in Co-doped indium-tin oxide films, in a temperature range from 5 to 400 K and in magnetic fields of up to 5 T. The films were grown on fused quartz substrates, by magnetron sputtering. ITO (In_2O_3 with 10 wt % Sn) homogeneous films doped with less than 20 at.% of Co seem to show intrinsic FM behavior. Magnetic hysteresis loops with coercive fields of up to 100 Oe at room temperature, as well as a ferromagnetic contribution in the difference between field-cooled and zero field-cooled magnetization, are observed in these films. We find that post-growth treatment strongly affects the electrical and magnetic properties of our films. This allows us to control the electron concentration of the films by varying the temperature and/or changing the ambient gas in the annealing process. A clear correlation between the values of the magnetic moment and of the electron concentration found for the ITO films doped with 10 at.% of Co seems to follow the predictions for a bound magnetic polaron percolation model. This suggests a carrier-mediated ferromagnetic mechanism.

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