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Room temperature ferromagnetism in transparent conducting Fe-doped In_2O_3 films MICHAEL OSOFSKY, HEUNGSOO KIM, MICHAEL MILLER, SEYED QADRI, RAYMOND AUYEUNG, ALBERTO PIQUE, Naval Research Laboratory — Oxide semiconductors have been widely studied as a host compound for spintronic devices since they can be doped with transition metals to realize a higher Curie temperature and can produce high n-type carriers by either doping with Group IV elements or introducing oxygen vacancies. Among various oxide semiconductors, Fe-doped In_2O_3 is a promising ferromagnetic semiconductor due to the high solubility of Fe-ions into the In_2O_3 lattice. Recently, at NRL, $In_{2-x}Fe_xO_3$ thin films have been deposited on MgO, sapphire, and YSZ substrates by pulsed laser deposition. The lattice constant decreases linearly with increasing Fe-doping concentration suggesting the incorporation of Fe ions into the In_2O_3 lattice matrix. Magneto-transport characteristics including anomalous Hall effect along with structural analysis demonstrate that an intrinsic ferromagnetism is observed for some films grown under optimized conditions. In this presentation, we will discuss our work to date on the growth of $In_{2-x}Fe_xO_3$ thin films grown by pulsed laser deposition with various deposition conditions and present the structural, optical, magnetic, and transport properties along with spin-polarization measurements.

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