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Carrier mediated Ferromagnetism in Cr: In₂O₃ RAGHAVA PANGULURI, P. KHAREL, C. SUDAKAR, R. NAIK, B. NADGORNÝ, G. LAWES, Department of Physics and Astronomy, Wayne State University, Detroit, MI 48201, R. SURYANARAYANAN, LPCES,CNRS,ICMMO, Universite Paris-Sud, 91405 Orsay, France, V.M. NAIK, Department of Natural Sciences, University of Michigan-Dearborn, Dearborn, MI 48128 — While a number of Dilute Magnetic Semiconducting Oxides (DMSO), when doped with transition metals, exhibit ferromagnetism well above room temperature, most of them are insulating and hence the relationship between the charge carriers and ferromagnetism remains unclear. Here, we investigate a high Curie temperature DMSO, Cr:In₂O₃, which is made conductive down to low temperatures. Films of various thicknesses ranging from 200 nm to 1100 nm were grown on sapphire substrate by rf sputtering. Upon vacuum annealing, the samples became both magnetic (with the saturation magnetization $\sim 0.07\mu\text{B}/\text{Cr}$) and highly conductive, in contrast to as-prepared samples which were both non-magnetic and insulating. Point Contact Andreev Reflection (PCAR) spectroscopy with the superconducting Sn tip demonstrated significant ($50\% \pm 5\%$) transport spin polarization, strongly suggesting that ferromagnetism in Cr:In₂O₃ is carrier-mediated. We will discuss the implications of these results on our understanding of the nature of ferromagnetic interactions in DMSOs, as well Cr: In₂O₃ potential applications as a spin injector.

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