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Room temperature ferromagnetism and spin polarization in Cr doped InN thin films AMBESH DIXIT, C. SUDAKAR, P. THAPA, R. PANGULURI, Department of physics and astronomy, Wayne State University, V. NAIK, Department of Natural Sciences, University of Michigan-Dearborn, R. NAIK, J. S. THAKUR, B. NADGORNY, G. LAWES, Department of physics and astronomy, Wayne State University — Understanding the development of ferromagnetism in transition metal doped semiconductors is a topic of great current interest. We studied the properties of chromium doped InN thin films fabricated by RF sputtering ($In_{1-x}Cr_xN$, where x= 0, 0.02 and 0.05) on c-sapphire substrates as a possible dilute magnetic semiconductor. We carried out detailed structural, optical, electrical, and magnetic characterization of these samples to investigate the interplay of these different materials properties. These films are found to be polycrystalline without any secondary impurity phases. Optical and electrical measurements indicate that these films are highly degenerate and have a carrier concentration of $\sim 10^{20}$ cm^{-3}. Most significantly, we find that these films show room temperature ferromagnetism. We present evidence for intrinsic magnetic properties through measurements of the spin polarization. The results are discussed in the context of carrier mediated ferromagnetism.

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