

Structure and Magnetic Properties of Substitutional (Fe, Gd) co-doped In_2O_3

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Diluted magnetic semiconductors (DMS) have attracted a great deal of attention due to their potential applications in Spintronics. Transition metals doped Indium Oxide (TM-doped In_2O_3) is nominated to be a promising DMS material. In_2O_3 is a transparent wide band gap, n-type semiconductor and crystallizes in a complex cubic bixbyite structure with 80 atoms in a unit cell. Therefore, compared to other host matrices, it would be a big challenge to achieve ferromagnetism in this matrix. In this research, the structure and magnetic properties of In_2O_3 powder co-doped with different impurity concentration of Iron (Fe) and Gadolinium (Gd) were investigated. These powders were prepared using solid state reaction method and the structural characterization was performed using X-ray diffraction (XRD). The magnetization was measured in a SQUID magnetometer. Room temperature ferromagnetism has been observed with distinctive coercive field of 1085 Oe. The zero field cooled and the field cooled magnetization measurements (Z_{fc}/F_c) show substitutional behaviors for all the samples and there is no sign for a formation of magnetic nanoparticles.