Structural, Morphological and Magnetic Properties of Co Ion Implanted CeO₂ Thin Films

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Abstract—*CeO*₂ has attracted great attention due to its unique properties and wide range of technological applications. It behaves like a conductor at high temperature and also important as oxygen storage and possess redox properties [1, 2]. Hence, it finds applications in catalysis and solid oxide fuel cells. The recent discovery of room temperature of ferromagnetism (RTFM) in dilute magnetic semiconductor oxide (DMO) systems, CeO₂ has been the subject of intense research in the field of spintronics. Present work is focused on the investigation of structural, morphological and magnetic properties of 150 keV Co ion implanted CeO₂ thin films. These thin films were deposited over the Si (111) substrate using RF sputtering technique. The deposition was carried out in Ar gas environment at RF power of 150 W for 1 hour. The structural, morphological and magnetic properties and magnetic properties of these films were investigated using experimental techniques such as X-ray diffraction (XRD), Raman spectroscopy, Rutherford back scattering (RBS), Atomic force microscopy (AFM), and Vibrating sample magnetometer. XRD and Raman spectroscopy confirms the FCC structure with Fm-3m space group in these films [3]. The magnetic propertied has been enhanced with Co fluence in these films.

References

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