**Investigation of Structural and Magnetic Properties of Gd doped Erbium Orthochromite**

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**Abstract**

Single-phase samples of Er1-xGdxO3 with an orthorhombic structure (x=0.0-0.25) were synthesised using a standard solid-state reaction method. The orthorhombic structure of these materials is stable at room temperature, and they exhibit antiferromagnetic ordering at low temperatures along with a weak ferromagnetic component. The Neel temperature remains relatively constant with increasing concentration of Gd, at approximately 143K. These materials also exhibit a fascinating spin re-orientation transition, which decreases toward lower temperatures with higher doping concentrations. The structural and magnetic properties of these materials have been thoroughly investigated in this study.



(a)

**(b)**

Fig. 1. (a) Moment Vs Temperature(T) plot with inset of dM/dT vs T plot (b) M – H loops at 15K and 30K for Er0.9Gd0.1O3.

References

1. N. Sharma ,B. K. Srivastava , A. Krishnamurthy , A.K. Nigam ; ‘Hysteresis in magnetization–temperature curves of the orthochromite La0.1Gd0.9CrO3’Journal of Alloys and Compounds 545 (2012) 50–52
2. Pragya Gupta and D Pal 2021 J. Phys.: Condens. Matter 33 135806.
3. B. Tiwari, M.K Surendra and M. S Ramachandra Rao; ‘Magnetic phases of erbium orthochromite’; Materials Research Express 1 (2014) 036102
4. Kumar, A., & Yusuf, S. M. (2015). The phenomenon of negative magnetization and its implications. *Physics Reports*, *556*, 1-34