

Disorder to ordering of spins in doped La₂CoMnO₆; Robust spontaneous exchange bias effect

A. Venimadhav¹ and J. Krishnamurthy¹

¹*Cryogenic Engineering centre, IIT Kharagpur, India*

The exchange bias (EB) is the phenomenon associated with the exchange anisotropy across the ferromagnetic and antiferromagnetic interface and it is ubiquitous to magnetic recording read heads and spintronic devices [1]. In contrast to field cooled CEB, in certain systems below the blocking temperature a spontaneous loop shift can be observed without the assistance of external magnetic field and this unusual zero-field-cooled M(H) loop shift is called spontaneous EB effect. We present a giant spontaneous exchange bias effect in Sr doped La₂CoMnO₆ sample. Structural and magnetic transitions have been found with Sr doping in La site. A systematic magnetic study has been carried by varying Sr content observed ferromagnetic transition followed by reentrant spin glass behaviour, phase separation to spin glass and ferromagnetic phases and to canted antiferromagnetic transition below 30 K. Giant spontaneous exchange bias effect is found only below the canted antiferromagnetic transition [2]. We discuss the disorder to ordering of spin states with Sr content using structural, Raman and magnetic studies.

References:

- [1] I. W. H. Meiklejohn and C. P. Bean, Phys. Rev. 102, 1413 (1956).
- [2] I. J. Krishna Murthy and A. Venimadhav, Appl. Phys. Lett 103, 252410 (2013)