Dynamic Minor and Major Hysteresis Loops of New Ferromagnetic Oxi-halide System $Co_7(TeO_3)_4Br_6$

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New oxi-halide $Co_7(TeO_3)_4Br_6$ reveals[1] sequence of magnetic orderings below T_N=34 K. Magnetism of this system is characterized by competing magnetic interactions dominated by strong single ion anisotropy energy of variously coordinated Co^{2+} ions[1]. We report on interesting magnetic dynamics in the compound's ferrimagnetic phase, $T \leq T_C$=27 K marked, at T_C, by unusually big imaginary part of ac susceptibility. Effective parameters of the compound's magnetism, notably a very large Arrhenius activation energy of 17.2 meV involved with domain wall dynamics, enable detailed studies of dissipative relaxations within experimentally favorable frequency window 0.05 Hz- 1 kHz. Cole-Cole plots are almost semi-circular, consistent with the validity of the Debye-relaxations model. Induction type hysteresis, in their transformation from minor to major loops, will be presented and interpreted within a simple model of thermally activated collective spin reversals. Associated dissipation is studied by imaginary susceptibility scanned by dc magnetic field ramping up and down.
[1]

[1]M. Prester, I. Živković, O. Zaharko, D. Pajić, P. Treggana-Piggott, and H. Berger, Phys. Rev. B **79**, 144433 (2009).