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Magnetic properties of a molecule-based Fe[TCNE]2 magnet[1]
KONSTANTIN POKHODNYA, Ohio State University/University of Utah, ARTHUR J. EPSTEIN, Ohio State University, MICHAEL BONNER, JOEL S. MILLER, University of Utah — The temperature dependence of magnetization $M(T)$ of Fe[TCNE]$_2$ $\bullet$xCH_2Cl_2, (x$\sim$0.3-1; TCNE = tetracyanoethylene) molecule-based magnet[1] demonstrates two phase transitions (at $T_1 \sim$ 95-100 K and at T_2 $\sim$10-25 K) whose temperatures depend upon the degree of disorder. The position of the ac susceptibility peak related to the high-temperature transition is almost frequency independent, while the low-temperature peak demonstrates a shift per frequency decade ($\phi = \mathrm{d}T/T_1)/\mathrm{d}(\log\,\omega)$ of 0.03 characteristic for spin-glasses. A coercive field H_{cr} (400 Oe at 2 K) decreases exponentially on warming and vanishes when approaching T_1. This behavior may be qualitatively described in terms of the Heisenberg mean-field model developed for the systems with competing ferrimagnetic (FM) and spin-glass ordering. At T_1 the system passes from PM to FM state (the M component parallel to H orders while the perpendicular M_{tr} freely rotates). On further cooling, the system begins to acquire a static M_{tr} component (non-vanishing H_{cr}). At T_2, a crossover between weak and strong irreversibility occurs and a spin- or a cluster-glass state is achieved. [1] K. Pokhodnya, N. Petersen, and J. S. Miller. *Inorg. Chem.* **41**, 1996 (2002)

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