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Evidence for complex multistability in photomagnetic cobalt hexacyanoferrates from combined magnetic and synchrotron X-ray diffraction measurements

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Cobalt hexacyanoferrates, which exhibit thermally- and photo-induced spin transitions, have been extensively studied as model materials for molecular-based photomagnetic solids. Synchrotron X-ray diffraction (XRD) experiments combined with magnetic measurements were used here to get some new insights in their diagram of phase transformation. For a $Na_{0.32}Co[Fe(CN)_6]_{0.74}$.$3.4H_2O$ sample composition, the high-temperature (HT) phase could be efficiently trapped by rapid cooling, thus allowing a comparison with the photo-induced phase directly formed at low temperature by light irradiation. In terms of magnetic behavior, the two metastable

phases strongly differ with lower critical temperature and magnetization values but higher decay temperature for the HT quenched phase. As a only slight change in the lattice constant with no symmetry breaking is reported from XRD, the differences between the two phases are discussed on the basis of local and disordered tilting of the [$Fe(CN)_6$] polyhedral units.

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