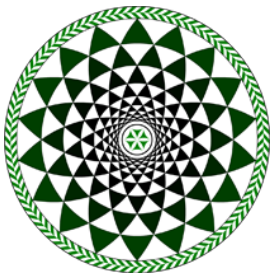

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A magnetic study of an anisotropic Cu^{II}-[W^V(CN)₈]³⁻ molecular metamagnet family

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A detailed magnetic study of a family of magnetic polymers [Cu^{II}(55'-dmbpy)]₂[W^V(CN)₈·(55'-dmbpy = 5,5'-dimethyl-2,2'-bipyridine) with different anions X: Br₋ (1) ,Cl₋(2), NO₃₋(3) is presented.

The magnetic properties of all three analogues are similar, showing antiferromagnetic ordering below 4.7, 3.9 and 2.8 K for 1, 2 and 3, respectively. They all exhibit a spin-flip transition at 3.0, 2.1 and 0.5 kOe, respectively (measured at T = 1.8 K).

The Cu^{II}-W^V coupling through -CN- bridges was determined to be ferromagnetic. The metamagnetic character of the compound is caused by a weaker antiferromagnetic interaction mediated through π-π stacking between the ferromagnetically ordered chains, which can be overcome by applying external magnetic field.

The system exhibits strong axial anisotropy. For 1, in which the effect is the most evident, it was studied in detail for ordered crystallites of the sample. A new method for aligning small crystallites that show axial anisotropy shall be presented. The dependency of the magnetic moment of the compound on the angle formed between the chains and the applied field was investigated, and the easy axis of magnetisation was determined to be the axis perpendicular to the crystal, which is also the axis perpendicular to the direction along the chains. The direction along the chains was determined to be the hard axis for magnetisation. Therefore, it can be postulated that the system possesses an easy magnetisation plane perpendicular to a single hard magnetisation axis.

Technical details of the measurements will be presented, along with the emergence of peculiar double hystereses when the sample is not immobilised, which is another proof for the occurrence of strong anisotropy within the discussed system.

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