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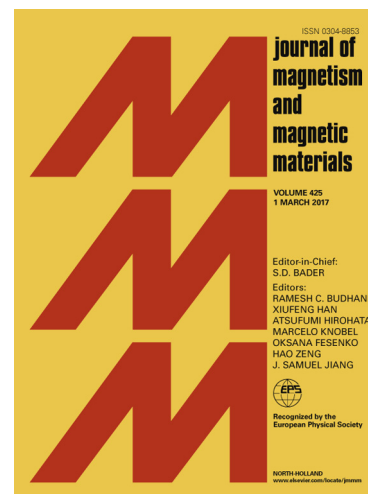
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Ageing effects on the magnetic properties of Mn₁₂-based Acetate and Stearate SMMs

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Abstract

A study of ageing effects on the magnetic properties of Single-Molecule-Magnets (SMMs) of the Mn₁₂ based Acetate, [Mn₁₂O₁₂(CH₃COO)₁₆(H₂O)₄].2CH₃COOH.4H₂O (**1**) and Stearate, [Mn₁₂O₁₂(CH₃(CH₂)₁₆COO)₁₁(CH₃COO)₅(H₂O)₄] (**2**) complexes has been carried out. Detailed magnetization (M) measurements as a function of temperature (T ~ 1.8 to 10 K), magnetic field (H ~ 0 to ±40 kOe) and time (t) have been performed on relatively fresh samples (**1A** and **2A**) and samples aged for ~ 4 weeks (**1B** and **2B**) of both Mn₁₂-Acetate and Mn₁₂-Stearate. The blocking temperatures (T_B) extracted from the measured M(T) lie between ~ 3.0 – 3.4 K for all the four samples. In all cases, below T_B , the M-H loops exhibit hysteresis with periodic steps. Interestingly, the ageing process leads to significant changes in the magnetic response of both the complexes. With ageing the Mn₁₂-Acetate exhibits a large increase in the magnetization drop near zero-field, but the estimated anisotropy energy barrier (U) remains unchanged ~ 71 K. Whereas, in the case of Mn₁₂-Stearate ageing results in a change of U from ~ 52 K (**2A**) to ~ 35 K (**2B**). The results are discussed in terms of possible ageing induced changes in the structural and chemical environment of the SMMs.

Keywords: magnetization, magnetic materials, Mn₁₂-Acetate, Mn₁₂-Stearate, SMM, ageing

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