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Spin-enhanced Magnetocaloric Effect in Molecular Nanomagnets MARCO EVANGELISTI, ANDREA CANDINI, ALBERTO GHIRRI, MARCO AFFRONTE, INFM-S3 National Research Center, Italy, EUAN K. BRECHIN, University of Edinburgh, United Kingdom, ERIC J.L. MCINNES, University of Manchester, United Kingdom — Unprecedentedly large magnetocaloric effect for the temperature region below 10 K is found for the Fe₁₄ molecular nanomagnet [Angew. Chem. Int. Ed. 42, 3781 (2003)]. We show that this comes out from a combination of several features, such as the spin ground-state that amounting to S=25 is amongst the highest ever reported, and the highly symmetric cluster core that results in small cluster magnetic anisotropy. The latter enables the occurrence of long-range magnetic order below $T_N=1.87$ K, probably of antiferromagnetic nature. We also show that low-lying excited S states additionally enhance the MCE of Fe₁₄. For these reasons, Fe₁₄ has therefore high potentiality to work as low-temperature magnetic refrigerant.

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