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Tuning of Magnetic Ordering in Single-Molecule Magnets MARCO EVANGELISTI, ANDREA CANDINI, ALBERTO GHIRRI, MARCO AF-FRONTE, INFM-S3 National Research Center, Italy, GUY W. POWELL, University of Manchester, United Kingdom, EUAN K. BRECHIN, University of Edinburgh, United Kingdom, DAVID COLLISON, SARAH L. HEATH, University of Manchester, United Kingdom — Single-molecule magnets (SMMs) are usually characterized by superparamagnetic blocking of the cluster spins. Magnetic interactions between cluster spins may, however, drive to long- range order when the cluster magnetic anisotropy is sufficiently small. Our experiments on the Fe_{17} SMM [Angew. Chem. Int. Ed. 43, 5772 (2004)] show that this is an unique example of system where both limiting cases are observable. By chemical substitution of intercluster ligands, we are able to change the space group symmetry without affecting the individual molecules, a.o. keeping the surrounding ligands, the cluster spin S = 35/2ground-state and magnetic anisotropy (uniaxial with $D \simeq 0.02$ K) unaltered. Antiferromagnetic long-range order at $T_N = 0.8$ K is found for $R\bar{3}$ symmetry, whereas any sign of ordering is wiped out for $Pa\bar{3}$ symmetry leaving a superparamagnetic blocking at $T_B \simeq 0.5$ K as the prevailing mechanism.

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