Abstract Submitted
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The Relationship Between Torsion and Anisotropic Exchange Coupling in a Tb(III)-Radical Complex[1] MICHAEL L. BAKER, TAKUYA TANAKA, Tohoku University, SEIKO KAWAMURA, KENJI NAKAJIMA, J-PARC, TAKAYUKI ISHIDA, The University of Electro-Commun., HIROYUKI NOJIRI, Tohoku University — The incorporation of paramagnetic ligands within anisotropic rare earth ion clusters has provided significant advance to the design of single molecule magnets with large blocking temperatures [1]. The exchange interaction in such systems is complex, difficult to probe, and little is known about structural relations. Inelastic neutron scattering and sub-THz electron paramagnetic resonance are used complimentary to investigate the large exchange interaction between a rare earth - radical pair in the Tb(hfac)3(2pyNO) complex [2]. Two molecular species exhibiting different Tb-O-N-C torsion angles of the paramagnetic 2pyNO ligand are compared. Antiferromagnetic Ising type $2p-4f$ exchange is determined for a low torsion angle (3.8 degrees) species. A different species with a larger torsion angle (15.8 degrees) is found to have weaker antiferromagnetic exchange and a non-degenerate ground state doublet. The origin of degeneracy lifting is due to an in-plane ferromagnetic component to the exchange matrix originating from $2p-5d$ charge transfer rather than a Dzyaloshinski-Moriya interaction.

[1] J. D. Rinehart, et. al., Nat Chem 3, 538 (2011).
[2] R. Murakami, et. al., Dalton Trans. 42, 13968 (2013).

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