Poster Presentation

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Pressure tunablity in ReX_4 based SMMs; A magnetostructural study

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Since the discovery of Single-Molecule Magnets (SMMs) in 1993 there has been extensive interest in understanding, developing and tuning the nature of magnetic interactions within SMMs with the intention of gaining greater insight into the nature of these interactions.[1] Typically this is done synthetically using variations in ligand geometry and co-ordination environment to vary magnetic behaviour. More recently it has been demonstrated that high hydrostatic pressure are also an effective mechanism for "tuning" properties such as magnetic susceptibility in a variety of SMMs.[2] The number of studies utilising high hydrostatic pressure to investigate molecular magnetism is extremely limited due to their inherent difficulty however we report a new study investigating the pressure tunabilty of Re(IV) based SMMs. 4d and 5d metal ions such as Re are of interest due their enhanced magnetic exchanges relative to their 3d analogues and Re(IV) based complexes are of particular interest. Previous studies into $[ReX_6]^{2-}$ (X = Cl, Br and I) anions demonstrate significant antiferromagnetic coupling, not transmitted through chemical interactions but rather through weak Re-X…X interactions in the solid state which may be easily perturbed at high pressure. [3] Therefore we report an investigation into the tunability of magnetic susceptibility in a variety of $[ReX_4]$ based compounds using high pressure magnetic susceptibility measurements and correlate the results with structure observations taken from high pressure single crystal X-ray diffraction experiments. The effects of the removal of solvent trapped in the lattice using temperature and vacuum and the corresponding effect on magnetic behaviour and chemical structure are also reported.

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