

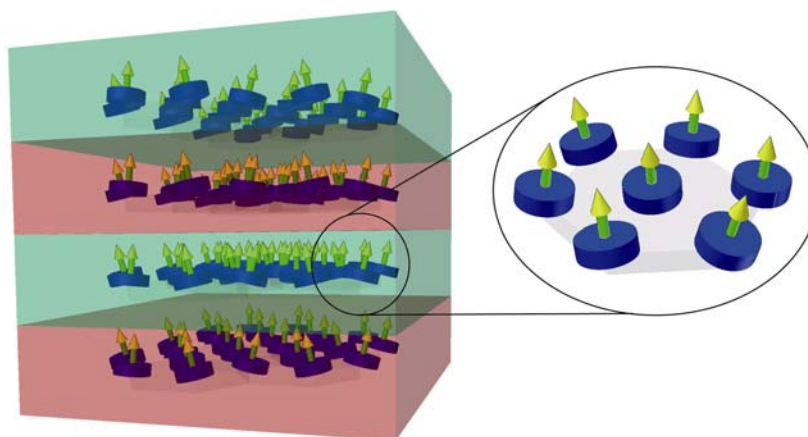
Measuring Single Molecule Magnets with XMCD

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Part of the current research on single-molecule magnets (SMM) is spurred by the prospect of building a molecular magnetic RAM with elementary bits of information stored in individual molecules. While the currently available technology is still unable to probe the magnetic state of a single SMM cluster, attempts have already been made by many groups at organizing SMM on surfaces and probing their collective magnetic behaviour. Surprisingly enough, one still waits for a report on the magnetic properties of a SMM monolayer, which questions our understanding of these systems and lowers the hope of using them in RAM memories.

We have synthesized a series of Mn_{12} -based compounds in which the acetate ligands are replaced by various gallic acid derivatives [1]. We shall describe how some members of the series then exhibit ordered mesophases while retaining their SMM behaviour. In addition, it has been found that these derivatives have an enhanced thermal stability as compared to that of Mn_{12} -Ac. The presence of a smectic phase in the phase diagram of traditional liquid-crystalline compounds is known to favour self-organisation in 2D structures, and we have successfully prepared monolayers on silicon surfaces with one of our compounds. Using synchrotron light we have performed XMCD studies (at subKelvin temperature) of the magnetic properties of such self-assembled monolayers. The unexpected result is that while the clusters indeed are present and most probably intact on the silicon surface, they have lost their SMM character. This effect actually seems to be quite general, we shall also present data gained on other SMM and offer a tentative explanation as to why one cannot observe any remnant magnetization.



References

- [1] E. Terazzi, C. Bourgoigne, R. Welter, J.-L. Gallani, D. Guillon, G. Rogez, B. Donnio
Single-Molecule Magnets with Mesomorphic Lamellar Ordering, *Angew. Chem. Int. Ed.* **47**,
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