

The endohedral magnetism: lanthanide ions in the nitride clusterfullerenes

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Encapsulation of lanthanide ions within the fullerene cage naturally raises the questions on the magnetic properties of such endohedral fullerenes. Moreover, since the number of encapsulated lanthanide ions can be as high as three (e.g., in nitride clusterfullerenes), the interaction of the magnetic moments of the endohedral ions in one cluster is also an important issue.

Until recently, magnetic studies of nitride clusterfullerenes consistently indicated the paramagnetic behavior of all lanthanide-based $M_3N@C_{80}$ compounds.¹⁻³ However, the recent discovery of the single-molecular magnetic behavior in $DySc_2N@C_{80}$ revivals the interest to the magnetic state of lanthanide ions in endohedral fullerenes and emphasizes the role of anisotropy.⁴ In this work we report on the recent progress in the studies of magnetic properties of nitride clusterfullerenes by means of X-ray magnetic circular dichroism, SQUID magnetometry and NMR spectroscopy.

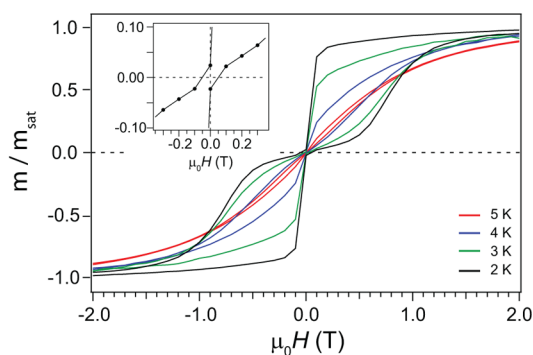


Fig. 1 Temperature-dependent magnetization curves for $DySc_2N@C_{80}$ recorded using SQUID magnetometry. Inset: enlargement of the 2 K signal at small fields; m_{sat} is the saturated magnetization at 7 T