

Students synthesize rare-earth metal complexes that are single molecule magnets and qubits. Working Together to Advance Quantum Science ... Next Generation Energy Storage. Clare Yu ... The special properties of the rare-earth metals also make them valuable in exploring the frontiers of quantum science. UCI has a focus of effort on these ...

Single-molecule magnets (SMMs) are paramagnetic molecules that can be magnetized below a certain temperature and have potential applications in high-density information storage, magnetic qubits, spintronic devices, etc. The discovery of the first SMM, Mn 12, opened a new era of molecular magnetism and promoted collaborative researches between chemists and physicists ...

A single-molecule magnet (SMM) is a metal-organic compound that has superparamagnetic behavior below a certain blocking temperature at the molecular scale. In this temperature range, an SMM exhibits magnetic hysteresis of purely molecular origin. [1] [2] In contrast to conventional bulk magnets and molecule-based magnets, collective long-range magnetic ordering of ...

Lanthanide-based single molecule magnets (SMMs) are a fascinating class of coordination compounds built by Ln 3+ ions coordinated to organic or inorganic ligands, which exhibit a slow relaxation of the magnetization and a magnetic hysteresis at the molecular level. Unlike traditional bulk magnets composed of a large number of atoms, SMMs are individual ...

rare-earth groups that ionically bonded to the perovskite frameworks is uniformly nanostructured and with precise long-range order. Results of magnetic and electron density measurements show that the so introduced rare-earth groups are SMMs occupying the A sites of the OMHP orderly. The average size occupied by each rare-earth group is in nano-

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Dysprosium compounds with high magnetic anisotropy are widely studied as single molecule magnets (SMMs). Here the anisotropic magnetocaloric effect in a Dy(III) SMM, {[Dy(OSiMe<sub>3</sub>)<sub>2</sub>(4-Mepy)<sub>5</sub>(BPh<sub>4</sub>)] 0.5Toluene}, was studied by single crystals. Angular dependent magnetization can be observed at 300 K because of its high magnetic anisotropy.

The coexistence of toroidal moment and ferroelectricity along with quantum magnetism in the rare-earth

# Rare earth single molecule magnet energy storage

single-molecule magnets yields a unique class of multiferroics. Keywords: multiferroic ... Raman magnetic relaxation, QTM, etc on the energy barrier, the experimental effective  $U_{\text{eff}}$  are much smaller than the calculated energy gaps between ...

The ingredients in this special recipe are rare-earth metals and an unusual nitrogen-based molecular bridge. Magnetic Hardness. The suitability of a molecule to become a magnetic data storage medium is dependent on the ability of its electrons to become magnetized and to resist demagnetization, also known as magnetic hardness.

Single-molecule magnets (SMMs) can retain their magnetization status preferentially after removal of the magnetic field below a certain temperature. The unique property, magnetic bistable status, enables the molecule-scale SMM to become the next-generation high-density information storage medium. SMMs' new applications are also ...

A family of lanthanide complexes has been synthesized by the subcomponent self-assembly methodology. Molecular architectures, which were stable in solution and under ambient conditions, were designed by the in situ formation of ligands around lanthanide ion templates. Magnetic studies indicated that, despite the low  $C_2$  symmetry, 1 and 2 display single molecule ...

Single-molecule magnets (SMMs) have attracted much attention due to their potential applications in molecular spintronic devices. Rare earth SMMs are considered to be the most promising for application owing to their large magnetic moment and strong magnetic anisotropy. In this review, the recent pr ...

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The demonstration of magnetic bistability in single molecule magnets containing one rare earth atom<sup>3,5,8,10</sup> illustrated the potential of single-atom spin centers in future storage ... The high stability of the Ho moment could find use in single-atom data storage applications. To exemplify this point, we built a stable two-bit atomic Ho array ...

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The complexes, each featuring an Er(III) ion sandwiched by two cyclooctatetraenyl rings, possess uni-axial magnetic anisotropy and display single-molecule magnet behaviors with energy barriers of 208(1) K for 1, 193(2) K for 2, and 217(18) K for 3, and blocking temperatures of 11, 10, and 9 K, respectively.

SMMs are nowadays denoted as single-ion magnets (SIMs) [11, 12]. This seems to be a vast success: chemists have rationalized the strategies to design a transition or rare-earth ion of strong Ising-type anisotropy [13, 14]; the slow relaxation energy barrier between the bistable states is gradually increased to nearly 2,000 K [15] and

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