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Field-dependent magnetic parameters in $\{Ni_4Mo_{12}\}$: Magnetostriction at the molecular level?[1] R. C. RAI, J. CAO, J. L. MUSFELDT, University of Tennessee, X. WEI, National High Magnetic Field Laboratory, J. SCHNACK, M. BRÜGER, Universität Osnabrück, M. LUBAN, P. KÖGERLER, E. MOROSAN, R. FUCHS, Ames Laboratory & Iowa State University, R. MODLER, Johann Modler GmbH, H. NOJIRI, Tohoku University — We present the optical and magneto-optical properties (0 - 32 T) of $Mo^{V}_{12}O_{30}(\mu_2\text{-}OH)_{10}H_2\{Ni^{II}(H_2O)_3\}_4$, a magnetic molecule with antiferromagnetically coupled tetrahedral Ni^{II} in a diamagnetic molybdenum matrix. A magnetochromic effect, centered at $\sim$1.9 eV, is observed at 4.2 K, and it is attributed to a change in the Ni $d \rightarrow d$ on-site excitation. The low-temperature magnetization exhibits steps at irregular field intervals, a result that cannot be explained using a Heisenberg model even if it is augmented by magnetic anisotropy and biquadratic terms. Field-dependent exchange parameter, however, provides the best fit to magnetization, suggesting that the molecular structure (and thus the interactions between spins) may be changing with applied magnetic field. The magneto-optical response of $Mo^{V}_{12}O_{30}(\mu_2\text{-}OH)_{10}H_2\{Ni^{II}(H_2O)_3\}_4$ supports a small change in the NiO_6 coordination geometry and the associated electronic single-ion properties.

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R. C. Rai
University of Tennessee

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