Abstract Submitted
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Magnetic Field Dependent Far-infrared Studies of Manganese-based Single-molecule Magnets[1] JIUFENG TU, The City College of New York, YOKO SUZUKI, S. MCHUGH, M.P. SARACHIK, CCNY, L. MIHALY, SUNY-Stony Brook, G.L. CARR, BNL, N.E. CHAKOV, G. CHRISTOU, Univ. of Florida — Far-infrared transmission studies of Mn12 single crystals (both aligned crystal assemblies and randomly oriented samples) have been carried out as a function of magnetic field below and above the blocking temperature. In these measurements the complete field-frequency map of the allowed magnetic dipole transitions can be determined as opposed to fixed-frequency cuts generated by standard EPR studies. The m_s=10 to 9 absorption lines (10 cm^{-1}) for the randomly oriented powder-like Mn12-acetate and Mn12-bromoacetate samples have similar line-widths at 0T, indicating that the disorder associated with the acetic acid crystallization does not dominate the line-width at zero field. Various contributions to the line-width will be discussed, such as: the spin-phonon interaction, dipolar fields, hyper-fine fields, and distributions in the anisotropy field. Interestingly, the 10 to 9 absorption line for the aligned crystal assemblies depends strongly on the magnetic history of the sample below the blocking temperature. The simple matrix element analysis is not adequate to explain this phenomenon, suggesting that it is due to some non-linear optical effects.

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