Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Hydrogen Bonding and Multiphonon Structure in One- and Two-Dimensional Polymeric Magnets[1] J.L. MUSFELDT, S. BROWN, J. CAO, University of Tennessee, M.M. CONNER, A.C. MCCONNELL, H.I. SOUTHERLAND, J.L. MANSON, Eastern Washington University, J.A. SCHLUETER, Argonne National Laboratory, M.D. PHILLIPS, M.M. TURNBULL, C.P. LANDEE, Clark University — We report a systematic investigation of the temperature dependent infrared vibrational spectra of a family of chemically related coordination polymeric magnets based upon two different bridging anions, fluoride (F^-) and bifluoride (HF_2^-), in copper-pyrazine complexes including $Cu(HF_2)(pyz)_2BF_4$, $Cu(HF_2)(pyz)_2ClO_4$, and $CuF_2(H_2O)(pyz)$). We compare our results with several one- and two-dimensional prototype materials including $Cu(NO_3)_2(pyz)$ and $Cu(ClO_4)(pyz)_2$. Unusual low temperature hydrogen bonding, local structural transitions associated with stronger low-temperature hydrogen bonding, and striking multiphonon effects that derive from coupling of an infrared-active fundamental with strong Raman-active modes of the pyrazine building-block molecule are observed. Based on the spectroscopic evidence, these interactions are common to this family of coordination polymers and work to stabilize the low temperature magnetic state. Similar interactions are likely to be present in other molecule-based magnets.

[1]This work is supported by the U.S. Department of Energy.

J.L. Musfeldt
University of Tennessee

Date submitted: 22 Nov 2006 Electronic form version 1.4