Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Control of Crystal Structure and Magnetism in Copper(II) Fluoride Based Coordination Polymers[1] JOHN SCHLUETER, SAUL LAPIDUS, Argonne National Laboratory, JAMIE MANSON, Eastern Washington University — Whereas magnetic copper (II) halide (halide = chloride or bromide) coordination polymers have been frequently studied, the copper(II) fluoride analogs have been much less investigated. This is due in part to synthetic challenges associated with solubility and reactivity. In analogy to cuprates, Cu-F-Cu linkages are expected to provide strong magnetic superexchange. The magnetic structure of such systems can be tuned by choice of ancillary ligand. Herein, we describe the use of various pyridines, diazines, and triazoles that have the ability to define the structural and magnetic dimensionality. Hydrogen bonding to the fluoride ligand provides an additional opportunity for designing molecule-based materials through a 'crystal-engineering' approach. Competition for intermolecular interactions frequently enables stimuli responsive behavior, including pressure-induced phase transitions. This will be illustrated for the $CuF_2(H_2O)_2$(pyrazine) coordination polymer and the five-coordinate $CuF_2(H_2O)_2$(3-chloropyridine) molecular solid. The use of new synthetic methods, including the use of high pressure, will be described. Subtle changes in reaction conditions leads to significant changes in structural and magnetic properties.

[1] Work supported by Argonne, a U.S. Department of Energy Office of Science laboratory, operated under Contract No. DE-AC02-06CH11357.

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Date submitted: 09 Nov 2012

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