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The origin and coupling mechanism of magnetoelectric effect in $TMCl_2-4SC(NH_2)_2$ ($TM = Ni$ and Co) E. MUN, National High Magnetic Field Laboratory (NHMFL), Los Alamos National Lab (LANL), Los Alamos, NM, J. WILCOX, J. MANSON, Department of Chemistry and Biochemistry Eastern Washington University Cheney, WA 99004 USA, B. SCOTT, MPA-MC, LANL, Los Alamos, NM, P. TOBASH, E. BAUER, MPA-CMMS, LANL, Los Alamos, NM, P. SENGUPTA, Nanyang Technological Institute, Singapore, C. BATISTA, Theory division, LANL, Los Alamos, NM, V. ZAPF, National High Magnetic Field Laboratory (NHMFL), Los Alamos National Lab (LANL), Los Alamos, NM — Most research on multiferroics and magnetoelectric effects to date has focused on inorganic oxides. Metal organic frameworks (MOF) are a new field in which to search for ferroelectricity and explore new coupling mechanisms between electricity and magnetism. We will present the magnetic and electric properties of $NiCl_2-4SC(NH_2)_2$, DTN, and $CoCl_2-4SC(NH_2)_2$, DTC, compounds as a function of temperature, magnetic, and electric field. We gain insights into the coupling mechanism by observing that in DTN the electric polarization closely tracks the magnetic ordering whereas in DTC it does not. For DTN, all electrically polar thiourea, $SC(NH_2)_2$, molecules are tilted in the same direction along the c-axis, breaking spatial inversion symmetry, whereas for DTC, two thiourea molecules are pointing up and the other two thiourea molecules are pointing down direction with respect to c-axis, perfectly canceling the net electrical polarization. Thus the magnetoelectric coupling mechanism is likely magnetostrictive adjustments of the thiourea molecule orientation in response to magnetic order.

E. Mun
National High Magnetic Field Laboratory (NHMFL),
Los Alamos National Lab (LANL), Los Alamos, NM

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