

$M_{3-x}(NH_4)_xCrO_8$ (M = Na, K, Rb, Cs): A NEW FAMILY OF Cr^{5+} - BASED MAGNETIC FERROELECTRICS R. Samantaray¹, R.J Clark¹, [Eun S. Choi²](#), [Haidong Zhou²](#), V. D. Bert¹, Naresh Dalal^{1,2}, ¹Department of Chemistry and Biochemistry, Florida State University, Tallahassee, Florida 32306, ²National High Magnetic Field laboratory, Tallahassee, Florida 32306-4005, USA

Upon consideration of the hydrogen - bonding properties of the NH_4^+ cation, we synthesized a new class of compounds, $M_{3-x}(NH_4)_xCrO_8$ (M = Na, K, Rb, Cs)¹. These magnetic compounds with the simple $3d^1$ ground state become ferroelectric. X-ray studies confirmed that the phase transition involves a symmetry change from $I\bar{4}2m \rightarrow Cmc2_1 \rightarrow P1$. The phase transitions were monitored by various experimental techniques such as: X-ray Diffraction, Heat Capacity, Dielectric and Raman scattering. The transition temperature depends linearly on the composition variable x. The transitions are of the order disorder type, with N-H...O bonding playing the central role in the mechanism.

References:

1. R. Samantaray, R.J Clark, [Eun S. Choi, Haidong Zhou](#), V. D. Bert, Naresh S. Dalal
J. Am. Chem. Soc. 2011, 133, 3792-3795