

Abstract Submitted  
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**Single Crystal Neutron Diffraction Study of Organic Multiferroic  $(\text{ND}_4)_2[\text{FeCl}_5(\text{D}_2\text{O})]$** <sup>1</sup> WEI TIAN, HUIBO CAO, JIAQIANG YAN, BRYAN CHAKOUMAKOS, BRIAN SALES, JAIME FERNANDEZ-BACA, Oak Ridge National Laboratory —  $(\text{NH}_4)_2[\text{FeCl}_5(\text{H}_2\text{O})]$  is a new organic multiferroic that exhibits intriguing magnetic/multiferroic behavior as a function of temperature and applied magnetic field. Unlike its counterpart compounds where  $\text{NH}_4$  group is replaced by K, Cs, and Rb,  $(\text{NH}_4)_2[\text{FeCl}_5(\text{H}_2\text{O})]$  is the only system that undergoes two successive magnetic transitions accompanied by pronounced spontaneous electric polarization. Large deuterated  $(\text{ND}_4)_2[\text{FeCl}_5(\text{D}_2\text{O})]$  single crystals were grown and characterized by specific heat and magnetization measurements showing no significant effects due to deuteration. Here we report single crystal neutron diffraction results that reveal an incommensurate antiferromagnetic order below  $T_N \sim 7.3$  K with a propagation vector of  $(0\ 0 \sim 0.77)$ . Higher harmonic Bragg peaks were observed indicate “squaring up” behavior upon further cooling. At 1.5 K, a field induced incommensurate-to-commensurate transition was also observed by applying magnetic field along the  $a$ -axis.

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Wei Tian  
Oak Ridge National Laboratory

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