Experimental report

18/02/2020

Proposal: 4-01-1553 **Council:** 10/2016

Title: Magnetic structure and spin excitations in new multiferroic material Cu2OCl2

Research area: Physics

This proposal is a new proposal

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Samples: Cu2OCl2
Cu2OCl2 (pwd.)

Instrument	Requested days	Allocated days	From	To
IN6	4	3	17/02/2017	20/02/2017
IN4	4	4	02/02/2017	06/02/2017
IN12	5	0		

Abstract:

We recently found a new class of spin-induced multiferroic materials - transition metal oxyhalides.
Here, we propose to obtain more detailed information about magnetic structure and chirality in Mellanothallite Cu2OCl2 that go beyond our recent powder neutron diffraction study.
Moreover, we propose to study also the lattice and spin excitations in multiferroic Melanothallite by means of inelastic neutron scattering combining both the IN6 (cold) and IN4 (thermal) TOF spectrometers. The IN6 and IN4 time-of-flight neutron spectrometer will be ideal for getting an overview of the entire energy range of excitations. Finally, we would like to search for hybridized phonon-magnon excitations in multiferroic Melanothallite that has a much higher critical temperature than most other known spin-induced multiferroic materials. Furthermore, we also would like to understand the driving force for the observed magnetic structure and the difference between pyrochlore iridiates, osmates and Melanothallite. Why is the claimed "all-in-all-out" spin structure absent in Cu2OCl2 and what is the hitherto unknown mechanism that induces multiferroicity in this new class of multiferroic materials?

See "***Multiferroic properties of melanothallite Cu_2OCl_2***"
H. Guo, L. Zhao, W. Schmidt, M. T. Fernández-Díaz, Ch. Becker, A. Melendez-Sans, W. Peng, M. Zbiri, P. Hansmann, and A. C. Komarek
Phys. Rev. Materials 3, 124405 (2019)