Experimental report

17/10/2019

Proposal: 5-31-2659 **Council:** 10/2018

Title: Determining the noncollinear magnetic structure in the chiral beta-Fe2SeO

Research area: Physics

This proposal is a new proposal

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Samples: CaBa(Mn2Fe2)O7

Instrument	Requested days	Allocated days	From	To
D2B	3	1	27/06/2019	28/06/2019
D1B	3	2		

Abstract:

beta-Fe2SeO is a novel magnetic compound that has been first synthesized and characterized only recently. It derives from the hypothetical "Fe3SeO" antiperovskite structure with vacancies on the metal site, whose ordering results in two structural modifications of Fe2SeO. The metastable alpha-phase is pseudo-tetragonal (space group Cmce), whereas the beta-phase is trigonal and chiral (space group P31, see Fig. 1). The Fe2+ ions in a distorted tetrahedral coordination form a complex frustrated magnetic sublattice that orders below TC = 105 K into a weakly ferromagnetic state, with a subsequent second transition to a presumably collinear antiferromagnetic state at TN = 79 K. These two transitions observed in magnetic susceptibility are reminiscent of those in hematite [2], but because of the lower crystal symmetry of beta-Fe2SeO, its order could represent a more complex noncollinear or non-coplanar spiral structure. As a result, this compound could combine pyroelectric and piezoelectric properties. Understanding the magnetic structure in the two ordered phases is the main purpose of our experiment.

The experiment was successfully conducted. The data are currently being analyzed.