Experimental report

15/03/2017

Proposal: 5-31-2267 **Council:** 10/2012

Title: Crystal and magnetic structures ofthe CaFe2+nO4+n familys members

Research area: Materials

This proposal is a new proposal

Main proposer: Yohann BREARD

Experimental team: Denis PELLOQUIN
Charlene DELACOTTE
Yohann BREARD

Local contacts: Emmanuelle SUARD

Samples: CaFe5O7

Instrument	Requested days	Allocated days	From	To
D2B	3	3	22/02/2013	25/02/2013

Abstract:

we have revisited the Ca-Fe-O system, focusing our attention on the family CaFe2+nO4+n. Terms n = 1, 2 and 3 have been isolated as single phase bulk ceramics-the syntheses are reproducible.Firstly, we have shown by building of the reciprocal spaces (E.D.) at room temperature that the real symmetry of compounds is not orthorhombic (as it was reported) but monoclinic (S.G. P21). Moreover, X-ray Le bail refinements Vs temperature, reveal that oxides go through a structural transition TS (TS= 350K for n =3, TS= 330K for n =2 and TS= 300K for n =1). This has been clearly confirmed by E.D. observations for which extra dots are detected at T<TS. Adding to that, the thermal dependences of the magnetic susceptibility and electronic conductivity show transitions at T=TS indicating an electro-magneto-structural coupling which as has never been reported. we ask for 3 days of beam time on the D2b diffractometer which would allows us to performed structural and magnetic characterizations

Magnetodielectric effect in crystals of the non centrosymmetric CaOFeS at low temperature by *C. Delacotte, O. Pérez, A. Pautrat, D. Berthebaud, S. Hébert, E. Suard*, D. Pelloquin and A. Maignan*. *Published in* ***Inorganic Chemistry*** Vol: 54, Issue: 13, P: 6560-6565 (JUL 2015)

Nearly pure powder sample and single crystals of the stoichiometric iron calcium CaOFeS oxysulfide have been synthesized by solid state reaction. The structural analysis of CaOFeS at room temperature by combining single crystal diffraction, neutron diffraction data and transmission electron microscopy leads to a stoichiometric hexagonal non centrosymmetric $P6_3mc$ layered structure