Experimental report

10/07/2023

Proposal: 5-31-2802 **Council:** 4/2020

Title: Neutron powder diffraction study on Fe(II)-azido layered magnetic honeycombs

Research area: Physics

This proposal is a new proposal

Main proposer: Zhendong FU

Experimental team:

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Samples: [Fe(4-Etpy)2(N3)2]n

Instrument	Requested days	Allocated days	From	To
D20	2	0		
D1B	2	1	02/09/2020	03/09/2020
D2B	2	0		

Abstract:

By linking Fe(II) ions with azido bridges, a 2D magnetic layered complex [Fe(4-Etpy)2(N3)2]n has been synthesized. It is the first pure 2D Fe(II)-azido polymer as well as the first example of Fe(II) layer with honeycomb topology. The magnetic susceptibility and the neutron flipping ratio data suggest that two ferromagnetic phase transitions possibly occur at 28 K and 39 K. The ac susceptibility also indicates that a spin glass behavior may take place at around 25 K. Due to the lack of inter-layer exchange pathways, the occurrence of long-range magnetic order is unlikely. Neutron powder diffraction measurements with higher resolution and more investigated temperatures will be necessary to reveal the nature of the complicated magnetism of this 2D magnetic system.

Experimental report: Neutron powder diffraction study on Fe(II)-azido layered magnetic honeycombs (Proposal 5-31-2802)

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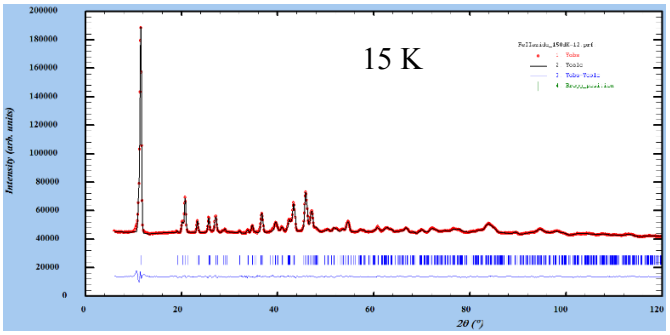
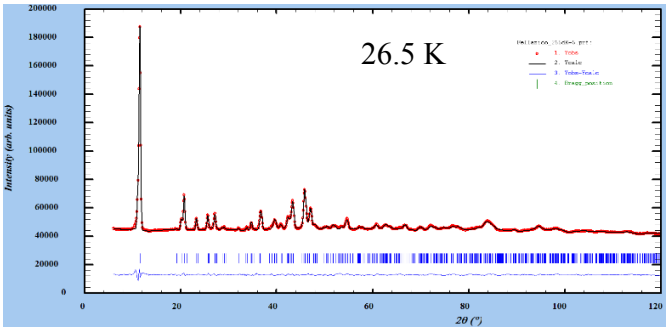
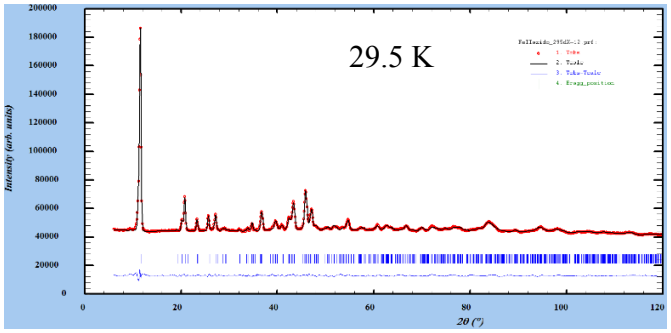
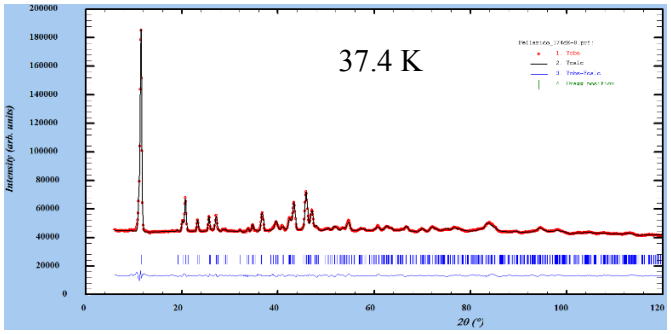
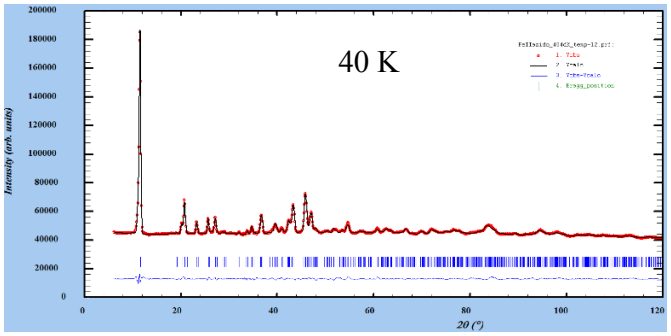
We have measured the neutron powder diffraction (NPD) spectra from powders of [Fe(4-Etpy)$_2$(N_3)$_2$]n on D1B at various temperatures from 15 to 100 K. The NPD spectra for 15, 26.5, 29.5, 37.4, 40 and 100 K are shown in the figures below. All spectra can be well fitted by the nuclear contributions only. The difference between the spectra for 15 and 40 K is also shown and found negligible as compared to the total intensities. Therefore, we conclude that there is no long-range magnetic order observed within the investigated temperature range.

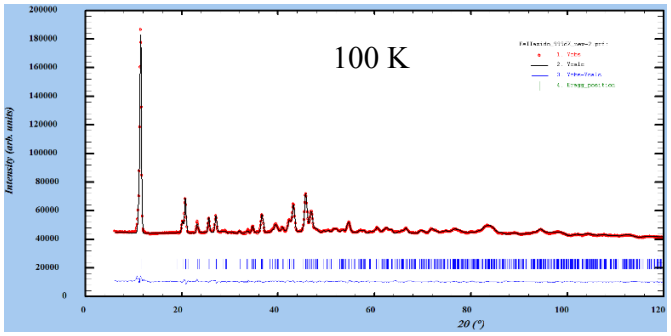


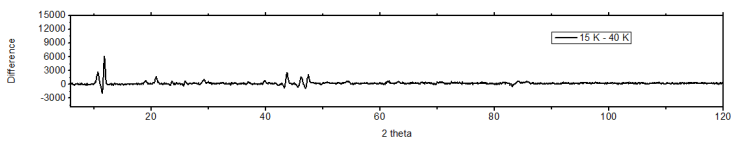



29.5 K
Intensity (arb. units)
2θ (°)


37.4 K
Intensity (arb. units)
2θ (°)


40 K
Intensity (arb. units)
2θ (°)


100 K
Intensity (arb. units)
2θ (°)


15 K - 40 K
Difference
2 theta