

Microsymposium

MS98.O04

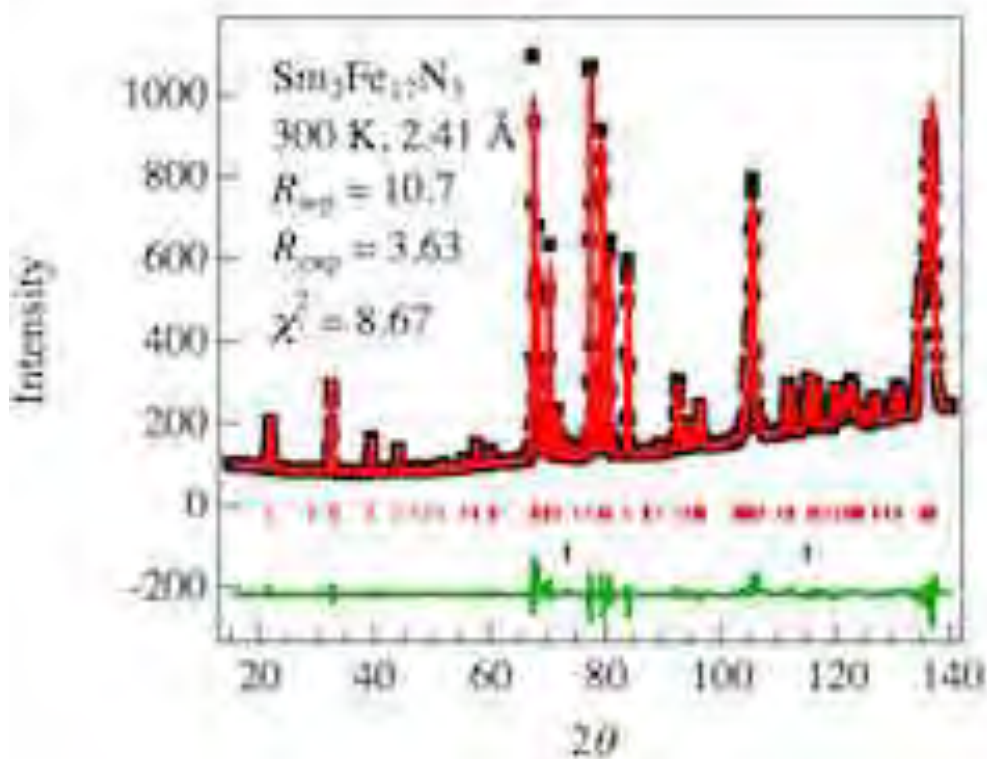
Magnetic structure analysis of rare earth permanent magnet Sm₂Fe₁₇N₃

K. Saito¹, N. Inami¹, Y. Takeichi¹, T. Ueno², R. Sagayama¹, R. Kumai¹, T. Hansen³, K. Ono¹

¹High Energy Accelerator Research Organization, Institute of Materials Structure Science, Tsukuba, Japan, ²National Institute for Materials Science, Tsukuba, Japan, ³Institut Laue-Langevin, Grenoble, France

Rare earth intermetallic compound Sm₂Fe₁₇N₃ exhibits notable magnetic properties such as high Curie temperature and high coercivity which are very suitable for permanent magnets [1,2]. Although microscopic magnetic structure is one of the basic information for magnetic materials, there is no report about the magnetic structure of Sm₂Fe₁₇N₃ for our knowledge. This is because samarium's neutron absorption cross section is huge enough to make researchers hesitate to have neutron diffraction experiments of Sm compounds. We have carried out powder neutron diffraction measurement of Sm₂Fe₁₇N₃ with a straightforward solution to the problem by taking long measurement time. Synchrotron x-ray diffraction measurements with single crystal has also been done to obtain initial crystal structure parameters for magnetic structure analysis and we have succeeded to analyze the magnetic structure of Sm₂Fe₁₇N₃ at room temperature. Among four Fe sites in the unit cell, while one Fe site which is the nearest neighbor of nitrogen shows smaller magnetic moment than normal iron, two Fe sites show enhancement in their magnetic moments. This phenomenon can be understood as 'cobaltization' of Fe by the adjacent nitrogen through hybridization.

[1] J. M. D. Coey and H. Sun, *J. Magn. Magn. Mater.* 1990, 87, L251, [2] T. Iriyama, K. Kobayashi et al., *IEEE Trans. Magn.* 1992, 28, 2326



Keywords: magnetic structure, permanent magnet