

X-RAY DIFFRACTION SPOT OBSERVATION OF $Tl_2Ba_2CuO_x$ USING FOCUSING COHERENT SYNCHROTRON BEAM WITH VARIATION OF A MAGNETIC FIELD

Daisuke Miyamoto, Takashi Ooba, and Takuya Suzuki*

Department of Chemical and Environmental Engineering, The University of Kitakyushu

Hibikino, Wakamatsu-ku, Kitakyushu, Fukuoka, 808-0135, Japan

* Corresponding author: Suzuki-t@env.kitakyu-u.ac.jp

1. Introduction

Recently, Diffractive imaging method have been interested in solid state field^{1), 2)}. In these, they studied direct beam analysis of focused X-ray fields and/or Gold nano-crystals. In this research, we select the $TlBa_2CuO_{6-x}$ (Tl-2201, $T_c < 90K$) to observe the variation of image by magnetic effects using focused coherent X-ray.

2. Experimental procedure

Tl-2201 single crystal is as grown. Spot image (004) of Tl-2201 in magnetic filed with N_2 -Liquid cooling, was observe x-ray diffraction method by the condensing optical system using Fresnel zone plate. Optical layout was shown in Fig. 1.

Magnetic field was generated by neodymium magnet (ca. 400 mT) and the distance to sample was 1mm. Sample temperature is 88K in constant. When the magnetic field was removed, spot images observation was started, and were saved 200 at each 15 s (exposure time is 5 s).

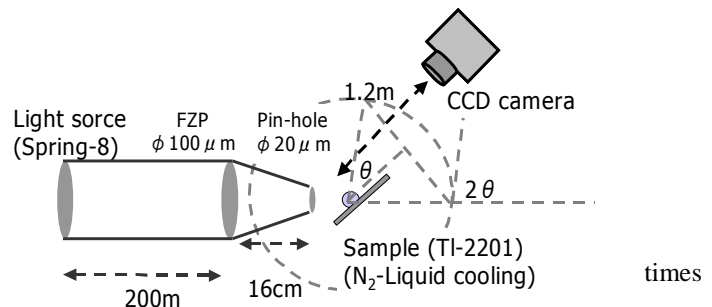


Fig.1. Optical layout

3. Results and Discussions

Fig. 2 shows the spot image and FFT images in a removing magnetic field. No big difference is seemed in the direct images, however pattern randomization is seemed in FFT images.

We have observed FFT image variation of Tl-2201 by changing magnetic filed. As a result, we insist that the X-ray coherent diffraction imaging can be use to observe these physical change.

4. References

- 1)H.M.Quiney, et. al, Nature Physics, **6**, 101(2006)
- 2)I.K.Robinson et.al, PBL, **87**, 195505-1(2001)

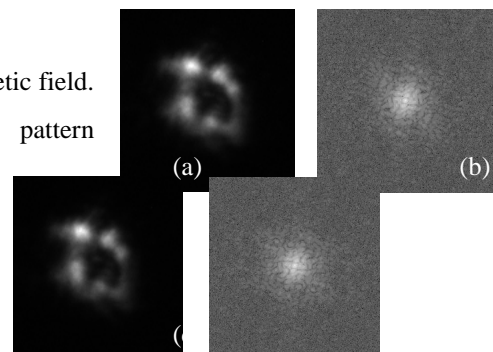


Fig.2 Spot images.

(a)0sec after direct image, (b) 0sec FFT
(c)20min after direct image, (d)20min after FFT