Contribution ID: **173** Type: **INVITED SPEAKER**

Development and applications of a Mössbauer camera

Wednesday, 15 September 2010 09:40 (40 minutes)

We developed a mapping technique for 57Fe Mössbauer spectroscopy using a Multi-Capillary X-ray lens (MCX or Soejima-Kumakhov lens), which provided a space resolution down to 50⊠m [1, 2]. There are, however, strong demands to study sub-micrometer-scale structures in materials science. Presently, we are challenging to improve the space resolution using a Fresnel-Zone Plate (FZP), which is known to provide a possibility to focus X-ray beam down to several 10 nm in diameter, if one would use it at a beam line of synchrotron facilities where a strong and sharp X-ray beam is available. In our laboratory, therefore, we combine a FZP with the MCX in order to focus 14.4keV ⊠-rays down to hundreds nanometers. The focal distance is 48 mm from the outlet of FZP lens. The experimental or and 3.7 GBq-57Co source mounted on a Mössbauer transducer. In order to evaluate the spot size of the combined ⊠-ray lens, the transmission counts of 14.4keV ⊠-rays are measured as functions of the X or Y positions of the Ta-knife-edge collimators by a Si-PIN detector. The measuring time is 55000 sec at each position. After subtracting the background from the original data (red points in Fig.2), we obtained the blue data points which shows two sharp peaks of the 1st order diffraction at around 155⊠m close to the beam center. In addition, two broad peaks appear at around 125 and 75 ⊠m, which correspond to the 2nd order diffractions. The position of the Ta knife-edge appears to be about 10⊠m deviated to the direction of the FZP from the exact focal position. Considering the focusing geometry and the half-width of the sharp peaks, the spot size expected at the focal position can be estimated about 3⊠m in diameter. The mapping images will be shown in the lecture.

Primary author: Prof. YOSHIDA, Yutaka (Shizuoka Institute of Science and Technology, Toyosawa 2200-2, Fukuroi-city, Shizuoka 437-8555, Japan)

Co-authors: KUMABE, Hiroto (Shizuoka Institute of Science and Technology, Toyosawa 2200-2, Fukuroi-city, Shizuoka 437-8555, Japan); SOEJIMA, Hiroyoshi (Shimadzu Corporation, Nishinokyo-Kuwabaracho 1, Nakagyo-ku, Kyoto 604-8511, Japan); HAYAKAWA, Kazuo; YUKIHIRA, Kenichi (Shizuoka Institute of Science and Technology, Toyosawa 2200-2, Fukuroi-city, Shizuoka 437-8555, Japan); ICHINO, Masahiro (Shizuoka Institute of Science and Technology, Toyosawa 2200-2, Fukuroi-city, Shizuoka 437-8555, Japan); AKIYAMA, Yuki (Shizuoka Institute of Science and Technology, Toyosawa 2200-2, Fukuroi-city, Shizuoka 437-8555, Japan)

Presenter: Mr YUTAKA, Yoshida

Session Classification: SURFACES, INTERFACES, THIN FILMS, NANOSTRUCTURES