

High-Resolution X-Ray Imaging Microtomography with Fresnel Zone Plate Optics at SPring-8

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A high-resolution CT system using a Fresnel zone plate (FZP) objective has been developed at SPring-8 [1]. The system consists of an in-vacuum type undulator light source of SPring-8, a Si 111 double crystal monochromator cooled with liquid nitrogen, a beam diffuser, high precision sample stages, a Fresnel zone plate objective with the outermost zone width of 100 nm and a high spatial resolution x-ray imaging detector. Resolving power of the system was evaluated from the CT images. For the precise characterization of resolving power, an artificial concentric multilayer is used as a resolution test pattern. Schematic drawing of the sample is shown in Fig. 1(a). A varied period Cu/Al multilayer with line/space of 0.3 μm - 0.1 μm is deposited on an Al core by DC magnetron sputtering at AIST Kansai [2,3]. Figure 1(b) shows a CT image of the test pattern at an x-ray energy of 7.1 keV, and Fig. 1(c) shows a line profile between A-B in the image. All of the layers up to line width of 0.3 μm are clearly resolved. Some 3-dimensional image data obtained with this system will be presented.

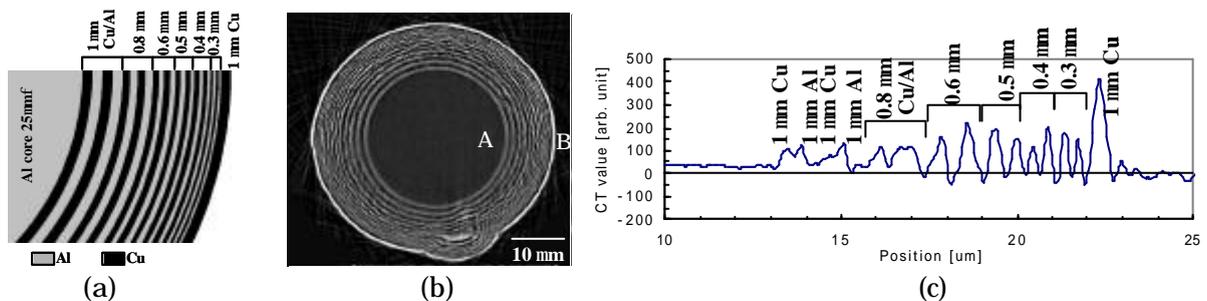


Fig. 1. Cu/Al multilayer resolution test pattern. (a) schematic drawing, (b) CT image, (c) line profile between A-B in the CT image.

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[2] K. Uesugi, Y. Suzuki, H. Takano et al: AIP Conf. Proc. 705, pp1316-1319 (2003).

[3] S. Tamura, M. Yasumoto, N. Kamijo et al: J. Synchrotron Radiation 9, 154 (2002).