

NANOSTRUCTURE ANALYSIS OF METALLIC MATERIALS BY COHERENT X-RAY DIFFRACTION MICROSCOPY

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Coherent x-ray diffraction microscopy^[1] (CXDM) is a novel technique for reconstructing a two- or three-dimensional image. After the first demonstration of CXDM by Miao *et al.*, several applications of CXDM have been reported. CXDM has a great potential as a new technique for structural studies of metallic materials because it is not only a non-destructive method but also applicable to a sample of micrometer thickness. In the present study, the validity of CXDM for this kind of observation was demonstrated using an age-hardened aluminum alloy in practical use. Also, Cu thin line samples were fabricated on Si₃N₄ membranes towards demonstration of electromigration analyses. Coherent x-ray diffraction patterns of the metallic materials were measured at BL29XUL in SPring-8. As the result, the internal structure and the shape of the aluminum alloy particle were three-dimensionally visualized^[2]. Characteristic diffraction patterns resulting from both the shape of the Cu thin lines and the defects formed by the application of the current were observed^[3].

1) J. Miao, P. Charalambous, J. Kirz, and D. Sayer, *Nature* 400, 342 (1999).

2) Y. Takahashi, Y. Nishino, T. Ishikawa, and E. Matsubara, *Applied Physics Letters* 90, 184105 (2007).

3) Y. Takahashi, H. Furukawa, H. Kubo, K. Yamauchi, Y. Nishino, T. Ishikawa, and E. Matsubara, *Surface and Interface Analysis* (in press)