

Soft X-ray Reflectivity and layer Structure Evaluation of Ni/C/Ti/C and Co/C/Ti/C Multilayers

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The development of highly-reflective multilayer mirrors for use in the water-window region has been desired for x-ray microscopy and x-ray photoemission spectroscopy. Co/Ti-based and Ni/Ti-based multilayers are appropriate candidates for such mirrors, because these combination theoretically has high reflectivity. Multilayer mirrors, Co/Ti with and without C barrier layers and Ni/Ti with and without C barrier layers, for a grazing-incident reflector to focus x-ray micro-beams were fabricated by magnetron sputtering. The layer structure, interdiffusion area, and interface roughness were evaluated by x-ray diffraction. Reflectivity measurements of these multilayer mirrors were performed at beamline BL-6.3.2 in ALS. The measured soft x-ray reflectivities of these multilayers were around 40% at a wavelength of 2.8 nm (near the Ti absorption edge) with an around 9-degree incident. The heat resistance of the multilayers with C barrier layers was superior to the multilayers without C barriers.

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