

Dynamic Observation of Restructuring process of Cu/W(110) with LEEM and Limited Area LEED

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It is known that the growth mode of Cu on W(110) surface is layer-by-layer at low temperature between RT and 150 °C. Auger intensity measured using CMA showed linear increase during the growth with slope changes at 1 and 2.13 ML_{W(110)} [1]. The normal emission Auger signal, however, shows a plateau between 2.0 and 2.47 ML_{W(110)} [2]. The discrepancy of these behaviors has still been unclear. In the present study, we observed the growth process of Cu on W(110) surface using LEEM and selected area LEED, and first clarified the restructuring process of the Cu double layer between 2.13 and 2.47 ML_{W(110)} and starting the third layer after 2.47 ML_{W(110)}.

LEEM images of the Cu/W(110) film growth at about 100 °C are shown in FIG. 1. The FOV is 10µm and the electron energy is 7.5 eV. FIG. 1(a) shows the 2nd layer growth with fractal-like pattern and anisotropic growth. In FIG. 1(b)-(d), the most remarkable change here is that the area with the grey contrast appears. The gray contrast area (2nd layer) spreads over the surface. The 3rd layer finally starts at around 2.47 ML_{W(110)} after most of the surface was converted to the gray contrast. The selected area LEED patterns taken at the dark and gray areas in FIG. 1(c) shows the mixture of the 15×1 and the Cu(111) 1×1 structure. It also found that the intensity of the Cu(111) 1×1 structure is much larger in the gray area than that in the dark area. This indicates that the restructuring of the Cu double layer from the 15×1 structure into Cu(111) 1×1 takes place before the starting the 3rd layer.

[1] Bauer E., Poppa H., Todd G. and Bonczek F., *J. Appl. Phys.* 45 (1974) 5164.

[2] Lilienkamp G., Koziol C. and Bauer E., *Surf. Sci.* 226 (1990) 358.

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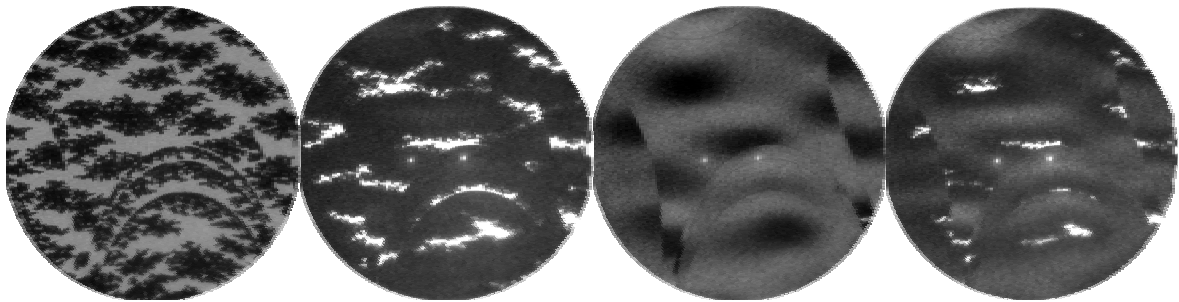


FIG. 1. Series of LEEM images during Cu growth on W(110) surface.

(a) 1.5 ML_{W(110)}, (b) 2.0 ML_{W(110)}, (c) 2.13 ML_{W(110)}, and (d) 2.30 ML_{W(110)}.