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One dimensional growth behavior of Xe atoms on step edges of Cu(111)

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A rare gas atom adsorbed on graphite or various metal surfaces has been extensively studied as a model two dimensional system because of its weak interaction with the substrate. In this study, we used a low temperature scanning tunneling microscope to understand the interaction of Xe atom with Cu(111) surface in the temperature range of 10K ~ 30K. Quite different one dimensional wetting behavior was observed at the lower and upper side of Cu surface steps. Xe atoms first adsorb at lower side of steps, but they reveal repulsive interaction among themselves. The Xe adsorbates then modify the Ehrlich-Schwoebel barrier, resulting in the wetting at upper side of steps. A model is proposed to explain the 1D growth behavior. As observed earlier[1], standing waves, caused by reflection of surface state electrons at step edges and impurities, were observed. It was also observed that the surface state energy is shifted in the presence of the Xe overlayer.

[참고문헌]

1. M. F. Crommie, C. P. Lutz, and D. M. Eigler, Nature 363, 524 (1993).