

Manipulating ion-induced ripple formation on Au(001)

Minwoong Joe¹, Byungnam Kahng², Jae-Sung Kim³, and Kwang-Ryeol Leel

¹Computational Science Center, Korea Institute of Science and Technology, Seoul 136-791, Korea

²Department of Physics and Astronomy, Seoul National University, Seoul, 151-747 Korea

³Department of Physics, Sook-Myung Women's University, Seoul 140-742, Korea

We study pattern development during ion beam sputtering of Au(001) at a grazing angle. Varying ion energy, flux, fluence and in-plane orientation of the substrate, controlling or designing of the sputter-induced patterns is investigated. To obtain a well-defined ripple structure, sufficiently large flux and match of crystal axis of the substrate to the in-plane ion beam direction are required. The ion energy and fluence are largely involved in growth of the pattern, but not in the order of pattern. Under our sputter parameter range together with metal substrate (which maintains its crystallinity under sputtering, contrary to semiconductor e.g. Si), ripple orientation depends on competition between ion beam direction (when erosion is dominant) and crystallographic direction (when surface diffusion is dominant). At an intermediate regime, effects of both are clearly visible in terms of degradation of ripple ordering.

Presenting author: Minwoong Joe