

Nano-patterns formed of Au(001) by dual ion beam sputtering

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Ion beam sputtering recently have much attention in nano-pattern formation, which is intriguing in applications and physical origins as well. The mechanism of this pattern formation has been simply explained by diffusion of surface atoms and erosion by the projected ions. The competition between smoothing by the diffusion and roughening by random erosion by impinging ions determines the characteristic length scale of the induced patterns such as pitches of dots or wavelengths of ripples. Here we introduce dual ion beam sputtering (DIBS) for nano sculpturing. In DIBS, the dual ion beams bombard the target surface simultaneously. In our experimental conditions, dual ion beam is perpendicular to each other and grazing from the surface normal in which condition ripple is usually produced. We show that Au (001) surface is engraved in cross-hatched style with four-fold symmetry laterally by DIBS. The evolution of this pattern is investigated in terms of fluence. We discuss how resultant morphology emerges and possibility of symmetry control of the nano-pattern in terms of the interference of two sputtering processes.