

Power density spectral analysis of ion-beam induced changes in surface morphology

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Ion irradiation, and particularly ion beam sputtering of surfaces results in the development of self-assembled nanostructures at certain irradiation conditions [1], [2]. If the ion beam direction is above a critical angle with respect to the target surface normal, ripple structures evolve perpendicular to the ion beam direction and at grazing incidence, the ripple structure gradually flips orientation from perpendicular to parallel. In case the substrate is irradiated at a temperature above its recrystallization temperature, the self-assembly of vacancies dominates the process, called reverse epitaxy [3].

We have investigated changes in surface morphology and possible pattern formation due to ion bombardment in a plasma immersion implantation (PIII) process. The surfaces of (100) Si monocrystalline samples were bombarded by 1 keV and 35 keV Ar ions generated by a RF plasma, accelerated by pulsing the bias voltage of the sample holder. The surface morphology was evaluated by Atomic force microscopy.

Surface morphology was further analysed using Fourier analysis. We are presenting results obtained by power density spectra estimate method.

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- [1] J. Muñoz-García et al., Mater. Sci. Eng. R-Rep 86 (2014) 1.
- [2] S. Facsko et al., Science 285 (1999) 1551.
- [3] X. Ou et Al., Nanoscale 7 (2015) 18928.