# Low energy ion beam induced pattern formation on Si and Ge surfaces

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Abstract
The fabrication of regular nanostructures on the nanometer length scale builds the basis for many technological applications in variety of fields, from optics to optoelectronics, to biological optics, to templates for the deposition of functional thin films, and to data storage industry. One effective method is the low-energy ion beam erosion of solid surfaces that is a widespread technique used in many surface processing applications. For particular sputtering conditions, due to self-organization processes, the surface erosion process can lead into well ordered nanostructures on the surface like ripples or dots.
Typically, during ion sputtering, the surface of the solid is far from equilibrium and a variety of atomistic surface processes and mechanisms become effective. It is the complex interplay of these processes that either tends to roughen (e. g., by curvature dependent sputtering or incorporation of surface contaminations) or smoothen (e. g., by surface diffusion or viscous flow of surface atoms) the surface, which, finally, can result in a rich variety of surface topographies.
In this talk the current status of self-organized pattern formation by low-energy ion beam erosion is summarized. In detail it will be shown that a multitude of patterns can evolve on the surface with a periodicity from 30 nm to 100 nm.[1,2] Furthermore a successful combination of conventional lithographically nanostructuring techniques with the ion induced self-organization processes that leads to hierarchical nanostructuring will be presented.

## References

[1]Ziberi B., Cornejo M., Frost F., and Rauschenbach B., J. Phys.-Condens. Mat., **2009,** 21, 224003.
[2]M. Cornejo, B. Ziberi, Ch. Meinecke, D. Hirsch, J. W. Gerlach, Th. Höche, F. Frost, B. Rauschenbach, Appl. Phys. A, **2011,** 102, 593-599.

## Figures

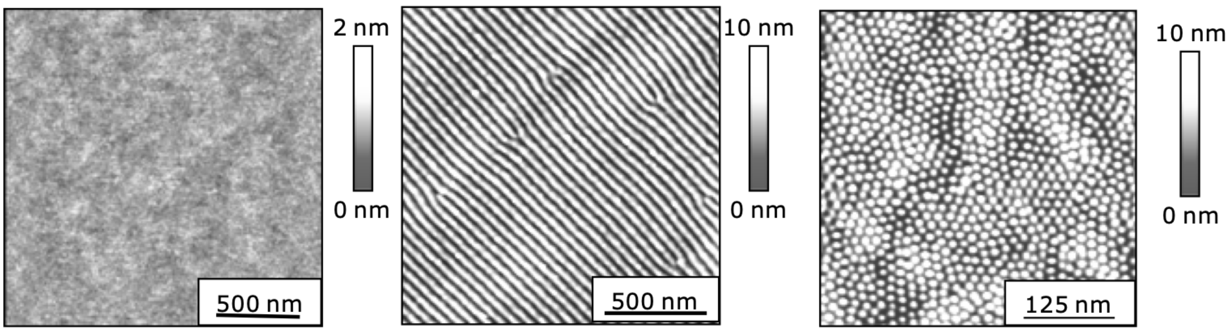


Figure 1. AFM images of Si surfaces after low energy ion beam erosion.