

Surface modifications on Si(111) due to impact of slow multiply charged ions

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An important way of producing nanometre-scaled structures (nanostructuring) on surfaces is kinetic sputtering by fast ions. Potential sputtering (PS), i.e. desorption induced by the potential energy of relatively slow multiply-charged ions (MCI), holds great promise for more gentle nanostructuring [1]. It can cause high sputter yields even for such low ion impact energies where kinetic sputtering and defect creation in deeper layers is not possible. While the physical mechanisms of PS have been the subject of extensive investigation (see [1] and refs. therein), technical applications of slow MCI have so far remained largely unexplored, despite the fact that slow MCI provide unique opportunities for etching, ultra-thin film growth and nanostructure fabrication.

We are currently investigating whether beams of slow MCI can be used effectively for nanostructuring. Slow MCI bombardment of various semiconductor and insulator surfaces will be applied under inert and/or reactive gas atmospheres in order to modify the surface around MCI impact sites. We will investigate the size of any produced structures and attempt to achieve control by varying the MCI impact conditions; e.g., the gas ion used, its charge state and kinetic energy. The investigations will be carried out with AFM and STM techniques working alternatively under UHV and ambient conditions. In this contribution we will discuss the present status of our project.

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Reference

- [1] F. Aumayr and HP. Winter, *Phil. Trans. R. Soc. London* 362 (2004) 77