

## Effects of Etching and Ion Irradiation

### Topic:

We are currently developing a new structuring method utilizing the irradiation of crystal lattices with ions. For this purpose a structured mask is fabricated on the substrate. The removal of this mask requires the application of a (wet) etching process. Such treatment can lead to damaging or contamination of the surface. This will lead to difficulties in achieving e.g. the desired surface roughness and can be to the detriment of subsequent process steps.

Next to that, it is known that the irradiation with ions affects material properties long before amorphization occurs. If this changes e.g. the adhesive properties of the surface this could influence the impact of the etching steps following the irradiation. Furthermore, the damage caused by ion irradiation can change the etching behaviour of the substrate material. This could lead to the formation of surface steps related to differences in etch speed.

The aim of this work is to investigate the changes on the surface and etching behaviour of a variety of substrates during the application of a range of common etching processes. Special attention is to be paid to the influence of irradiation with different ions.

### Tasks:

- Irradiation of samples with our accelerator 4GABIS
- Investigation of surface topology and etch steps via atomic force microscopy
- Investigation of the chemical composition of the surface via Auger electron spectroscopy
- (Optional) Treatment of samples with different etching processes.

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### Literature:

D. Tang et al. (2007), *Broad Beam Gas Ion Source with Hollow Cathode Discharge and Four-Grid Accelerator System*, <https://doi.org/10.1016/j.nimb.2007.01.258>

User Manual for the Bruker Dimension EDGE AFM:  
<file:///xanthos/Nanooptics/Manuals/BrukerDimensionEdge/Edge/Default.htm>

S. Hofmann (2013), *Auger- and X-ray Photoelectron Spectroscopy in Materials Science: a User-Oriented Guide*, Springer Series in Surface Sciences 49