

Fabrication of Shallow Gratings via Ion Irradiation

Background:

Shallow gratings usable e.g. in the EUV spectral range are challenging to produce with conventional etching techniques. We investigate an alternative approach relying on localized swelling caused by an irradiation with ions.

Objective:

Our unique four-grid accelerator broad ions source (4GABIS) is to be utilized to irradiate target materials through suitable masks. The aim of this is to create gratings with height differences between ridge and valley in the range of single digit nanometres. In particular, we are interested in silicon targets irradiated with argon ions within the energy range of 10 to 30 keV in comparison to other ion species. The resulting swelling is to be investigated in dependence of a variety of irradiation parameters such as fluence or ion flux.

Tasks:

- Operation of our accelerator 4GABIS
- Etching in clean room environments
- Measuring surface topology via atomic force microscopy

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Literature:

J. Kaufmann et al. (2023), *Fabrication of Nanometre Sized Gratings via Ion Irradiation*, <https://doi.org/10.1051/epjconf/202328705003>

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>