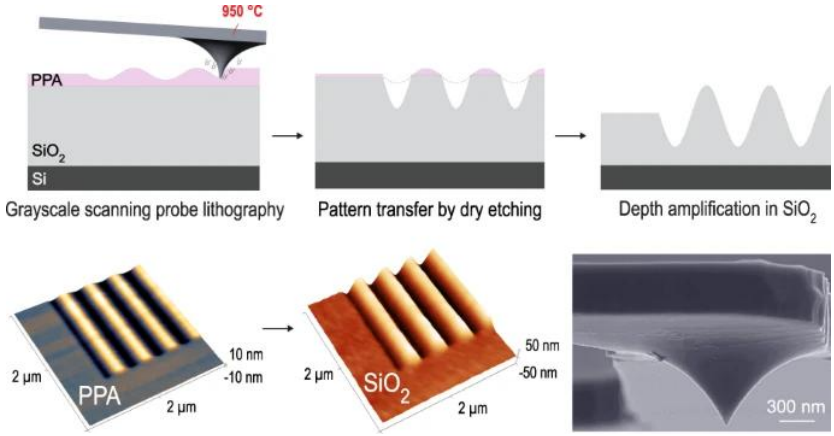
# Amplification of greyscale nanopatterning via thermal scanning probe lithography and dry etching techniques

**Type**: Master/Semester project

**Fields**: Microengineering- Material Science-Additive Manufacturing

**Project Overview**

Greyscale-structured surfaces with nanometer-scale features are increasingly being explored for applications in optics and fluidics. Thermal scanning probe lithography (t-SPL) enables high-resolution patterning with excellent vertical resolution. However, its maximum achievable patterning depth in resist is limited. This project aims to combine t-SPL with plasma dry etching to amplify nanoscale resist topographies into dielectric substrates while maintaining high pattern fidelity and reproducibility. Characterization techniques, including atomic force microscopy (AFM) and scanning electron microscopy (SEM), will be employed to accurately quantify the resulting surface topography and evaluate the fidelity of pattern transfer and amplification. Such a method for aspect ratio amplification and smooth greyscale nanopatterns has the potential to find application in the fabrication of photonic and nanoelectronics.




**What You Will Work on**

Tasks will be tailored to your background and interests and may include:

- Design greyscale geometry input for the t-SPL nanopatterning
- Test different dry etching recipes and tune the relevant etching parameters
- Measure the topography of greyscale before and after dry etching to study how different etching parameters affect the amplification.

**Why join**

- Hands-on experience in advanced nanofabrication
- Work on an interdisciplinary research study

**Reference:**

[1] Berke, et al. *Microsystems & nanoengineering* 10.1 (2024)

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