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Master thesis

Selective growth of epitaxial ZnO NWs and fabrication of piezoelectric sensors

Motivation:

Because of various promising future applications in robotics or medicine, tactile sensing based on piezoelectric sensors has attracted intense interest. ZnO is a fascinating candidate as it crystallizes in a wurtzite structure and has a high piezoelectric coefficient. This project aims to grow ZnO nanowires (NWs) selectively and to develop piezoelectric sensors by contacting single and combinations of NWs.

Outline project:

The successful candidate will work with various techniques and devices used in modern semiconductor industry and in nanotechnology. The substrate used for the chemical vapor deposition of ZnO NWs will be pre-patterned using laser interference lithography (LIL). LIL is an ideal technique for large-scale periodic patterning on the nanometer scale. The piezoelectric sensing properties will be characterized with AFM for single NWs as well as with macroscopic contacts.

Experimental techniques:

- Laser interference lithography
- Direct laser writing
- Scanning electron microscopy
- Atomic force microscopy
- Atomic layer deposition
- Chemical vapor deposition
- Piezoelectric characterization

Pre-knowledge based on the Institutes lectures (Nanotechnology, Nanomaterials, ...) are of advantage. If you are interested in this topic or if you have any questions, contact Maximilian Kolhep (maximilian.kolhep@imtek.de).