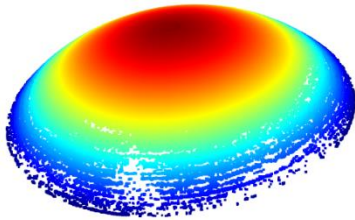# Metrology of micro-3D-printed polymer structures – adapting surfaces for steep slope detection

Measurement of a 3D-printed microstructure with detection errors due to a steep slope. Diameter ~ 140 µm

Python source code for data evaluation.

Motivation: Welcome to the exciting field of micro-/nanotechnology. At the 3MS-group, we use two photon lithography (TPL) to fabricate microscopic optical elements and systems. TPL as a 3D printing technology allows us to fabricate almost any imaginable micro-/nanostructure in polymers. This enables highly integrated and specialized applications, for example in endoscopy. Measuring the manufactured structures is essential to achieve functional micro-optical elements.

In your work, you will help us to investigate a new method to measure micro-optical surfaces. Common measurement devices (like confocal microscopes and while light interferometers) are limited in the detection of steep surface slopes. A new approach will help us to detect these steep slopes. The approach requires an adequate digital data processing (preferably programmed in python). Furthermore, the acquisition of measurement data from multiple modalities is needed.

We offer you the chance to acquire hands-on experience with high-end optical metrology devices. Available devices include a state-of-the-art confocal microscope, white light interferometer, and scanning electron microscope, which are commonly used in industry. You will get exposure to the workflow of 3D printing and micro-/nano- fabrication. Moreover, you will collect valuable experience in programming, data processing and computer-aided design (CAD).

Work Packages:

- Literature research of metrological technologies and their capability to detect steep slopes
- Acquisition of metrological data using our white light interferometer and other devices
- Parameter searches for supporting surface modification
- Development of data processing methods (preferably in python programming language)
- Analysis of measurement results

Requirements:

- Basic knowledge in programming (ideally Python)
- Language: English or German
- Interest in optical technologies and metrology in particular

Start: 01.12.2023 or as discussed

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