

Master Thesis:

Simulation, Fabrication, Characterization and Replication of Micro-Optical 3D-Freeform Structures

We use three-dimensional (3D) two-photon polymerization (TPP) to fabricate a variety of optical devices and systems such as refractive and diffractive optics with unprecedented design freedom. For high-performance components, shape control and surface quality are crucial and have to be systematically optimized. Additionally, different methods for replication have to be developed to enable high volume production.

Your tasks:

- Simulate and design optical freeform components
- Fabrication of optical components using a 3D-Printer
- Measure the surface quality, shape and performance of the fabricated structures with methods such as SEM, AFM, mechanical profilometry, VSI and other optical methods
- Replication using various methods including electroforming, hot embossing and micro-molding

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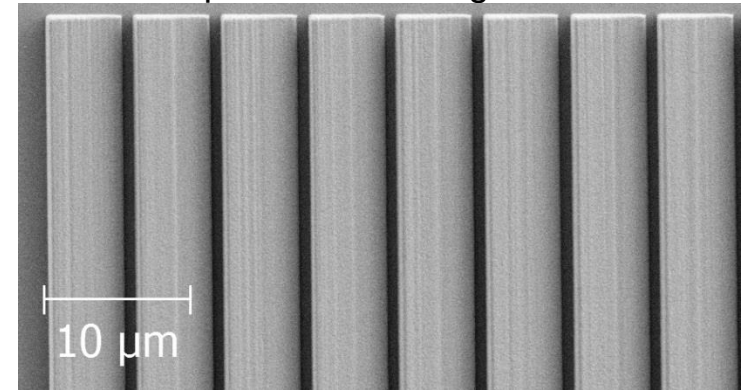


Fig. 1: Blazed grating written with three-dimensional two-photon polymerization.

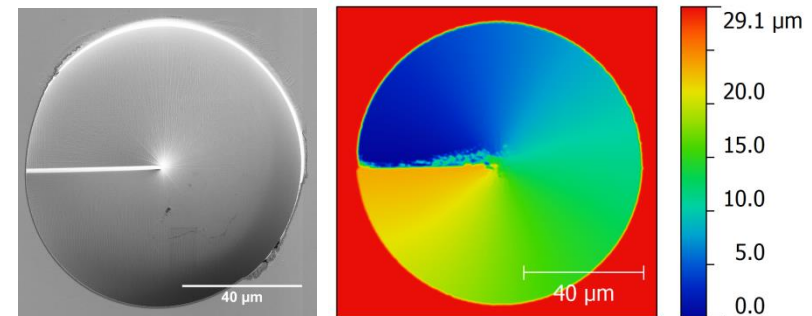


Fig. 2: Spiral phase plates in a shim that can be used for replication. Fig. a) Electron microscopy. b) White light interferometry.