Master Thesis:
3D-printing for optical system assembly

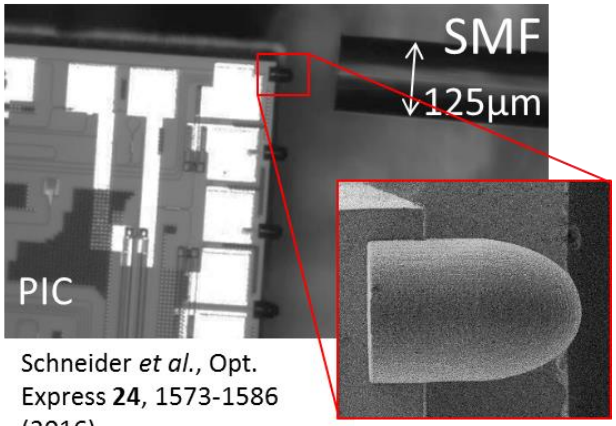
Karlsruhe Institute of Technology

Optical systems comprising single-mode fibers (SMF) and photonic integrated circuits (PIC) are of high relevance for application from **optical communications** to **metrology** and **bio-sensing**.
We use **3D-printing** based on two-photon polymerization to structure lenses both on PIC, see Fig. a) and SMF, see Fig b) to enable low-loss coupling. To combine single components into a system, they need to be placed with micrometer accuracy using a fineplacer.

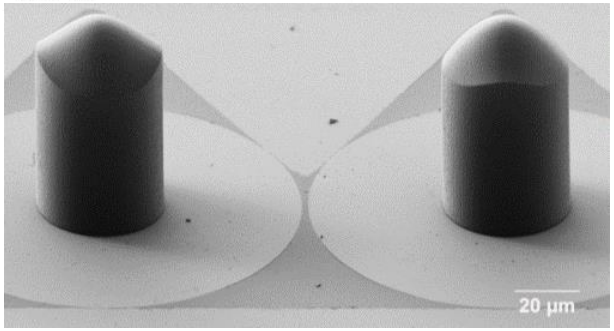
Your tasks:

- Simulate and optimize freeform optical components
- Establish a positioning process using a fine-placer
- Characterize optical systems using electron microscopy, white-light interferometry and optical coupling experiments.

The focus of this thesis is on experimental, practical work. Some optical and mechanical simulation will be required. Starting: as soon as possible. Location: CN (IMT) and CS (IPQ). The thesis will be in cooperation with the startup Vanguard Photonics.



Schneider *et al.*, Opt. Express **24**, 1573-1586 (2016)



3D-printed lenses for coupling from a optical chip to a single-mode fiber (SMF). **a)** Lens on photonic-integrated circuit (PIC). **c)** Two anamorphic lenses on a SMF-array.

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