

Deep X-ray lithography uses synchrotron radiation to pattern thick PMMA layers (thickness: several microns up to several millimetres) in order to achieve high aspect ratio microstructures (aspect ratio up to 50). The structures are characterised by very steep sidewalls (slope angle better than 1 mrad) and sidewall roughness in the range of 20 to 30 nm. For optical applications usually microoptical benches with cylinder lenses, prisms and fixing structures for other optical components are fabricated. The structures are either used as prototypes, as lost form for metal replication or as moulds to fabricate mould inserts.

## Contact

See KNMF website or contact the KNMF User Office.

## Features

- Aspect ratios up to 50
- Structural height up to several millimetres
- Structural details less than 1  $\mu\text{m}$
- Slope angle better than 1 mrad

## Limitations/constraints

- Only PMMA and SU8 (in case of prototyping)
- Time consuming process for prototyping due to mask fabrication (4 to 6 weeks)

## Design rules

- Rounding of structural edges (radius > 5  $\mu\text{m}$ )

## Typical structures and designs

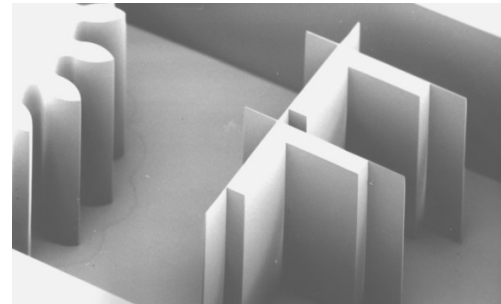


Fig. 1: 500  $\mu\text{m}$  high PMMA structure (width of the small bar: 5  $\mu\text{m}$ )



Fig. 2: Gear wheels and anchors made out of Au (99%) and Ni/Co alloy

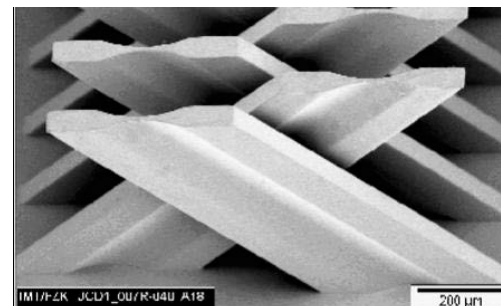


Fig. 3: Crossed X-ray lenses (SU-8)



Fig. 4: Microoptical bench with cylindrical mirrors and fixing structures