

SERVICES AND SOLUTIONS

FOR LARGE AREA NANOIMPRINT TECHNOLOGY



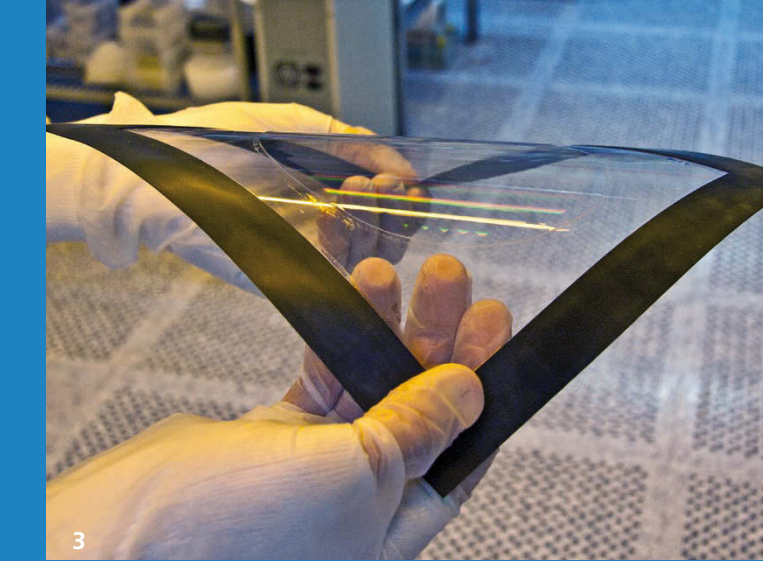
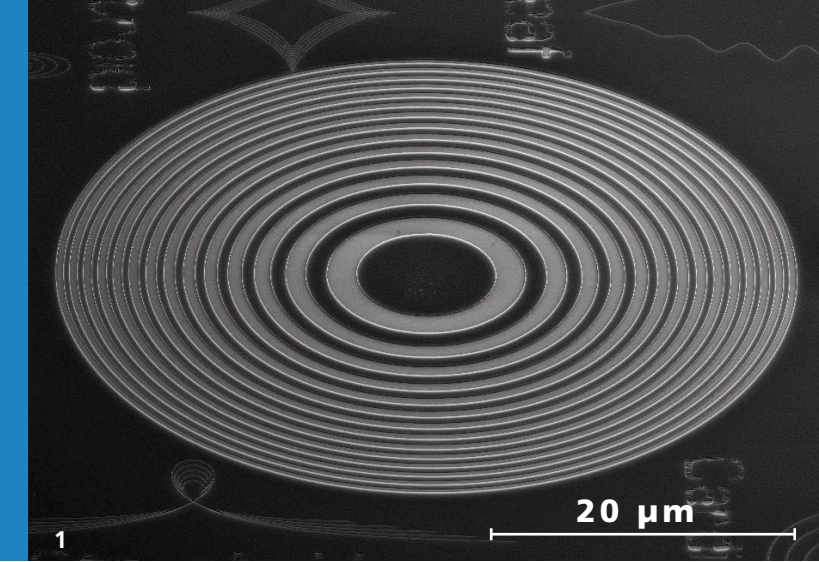
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Master design and fabrication

- Pattern creation with various lithography technologies
 - Conventional optical
 - E-beam
 - UV-enhanced nanoimprint (UV-NIL),
 - UV-enhanced substrate conformal imprint lithography (UV-SCIL)
- Pattern formation with dry etching processes into various substrates like silicon, silica or metals
- Anti-sticking layer (Perfluorodecyltrichlorosilan mono layer) with molecular vapor deposition (MVD)

1 SEM image of a Fresnel lens in a silicon master manufactured with the following process:

- e-beam lithography
- silicon dry etching

2 Photograph of the replication process on a 150 mm silicon wafer with a periodic pillar pattern

COVER PAGE

Flexible UV-SCIL PDMS stamp and resulting nanosized structures on a silicon wafer

Customized fabrication of large area PDMS stamps for UV-SCIL

- Stamp manufacturing
 - Fast replication with high resolution
- Stamp life time
 - Analysis of the interaction between the PDMS stamps and different resist materials
 - Optimization of stamp life time by PDMS material variations
- Stamp inspection
 - Defect control and analysis with SEM, AFM and optical methods

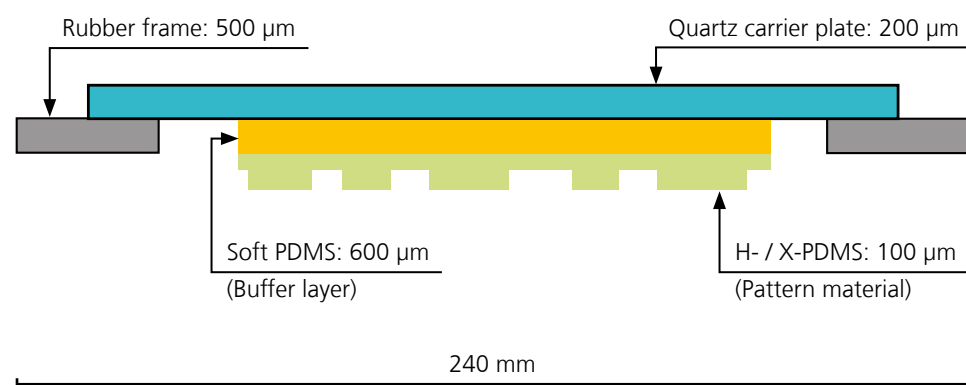
3 Flexible UV-SCIL stamp consisting of the following three layers:

- 200 μm quartz carrier plate
- 600 μm soft PDMS buffer layer
- 100 μm pattern containing H- / X- PDMS layer

4 Photograph of a replicated and imprinted 2.5D Fresnel lens into an epoxy based resist

Manufacturing of PDMS stamps for UV-SCIL

- Gentle replication and separation of masters
 - 100 mm, 150 mm and 200 mm master size
- Three layer approach for flexible high resolution stamps
 - Thin quartz carrier plate
 - Soft PDMS buffer layer
 - Structure containing hard PDMS layer



Schematic cross section of a PDMS stamp for UV-SCIL

Process development for UV-SCIL

- Imprint process development for
 - high throughput patterning
 - organic and inorganic resist systems
 - low defect density and defect control
- Evaluation of all kind of resists
- Structure transfer with dry etching
 - Optimization of the selectivity of imprint resists to various materials
 - Up to 200 mm substrate size
- Prototype patterning with SCIL on MA / BA8 SUSS tool
 - Quality management
 - Long term tests
 - Process integration