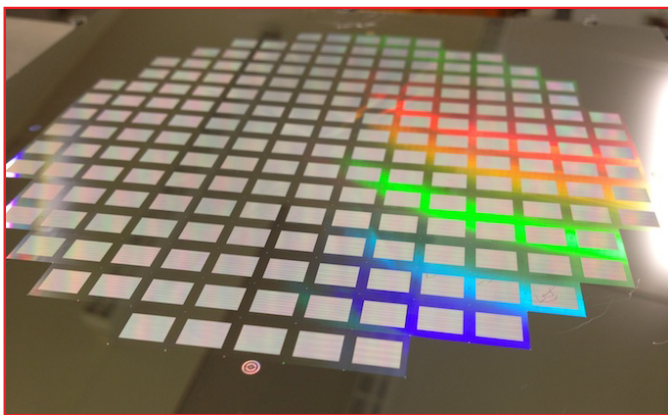


Replication-Tools for micro-optics

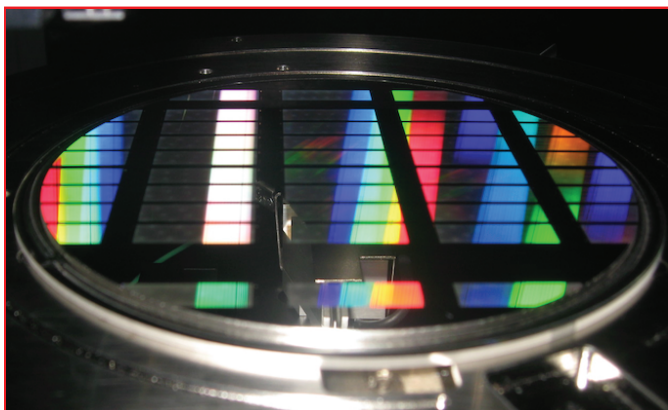
Microstructured Nickel-stamps of highest quality for micro-optics

applied microSWISS AG is an innovative manufacturer of Nickel-stamps for hot-embossing and inserts for injection-moulding for more than 20 years. Our tools are shipped ready-to-use.

We are your partner for your micro- / nano-structured tools. We have profound experience and solutions for features-sizes from 70nm to 500µm. We can transform your optical master pattern into replication tools.



Hybrid Nickel-stamp with refractive and diffractive elements mixed



Hot-embossing Nickel-stamp with diffractive elements

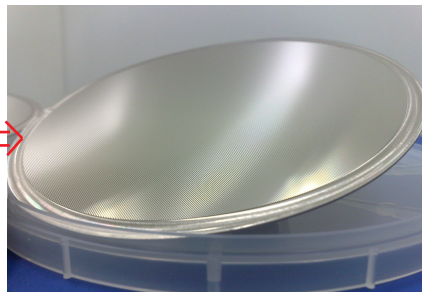
Specification highlights

- Structural range = 70nm - 500µm
- Step height uniformity = 3 – 5 %
- Manufacturing according to adapted LiGA-process
- Multilevel pattern available (micro+nano)
- Alignment-precision level-to-level $\leq 3 \mu\text{m}$
- Alignment-precision micropattern to machined features $\leq 20 \mu\text{m}$
- Extraordinary tool flatness $< 10 \mu\text{m}$
- Parallelism to lapped backside $\leq 10 \mu\text{m}$
- Stamp thickness: 0.5– 6mm
- Robust handling
- Integration of mounting features
- Ready-to-use stamps according to customer drawing
- Contour wire-electrodischarge machined
- Compatibility to hot-embossing and injection-molding equipment
- Available antisticking-coating (fluoro-based)
- Available wear-protection coating (TiN)
- Compatibility to most patterning methods:
 - e-beam resists (PMMA, HSQ)
 - XIL- resists
 - UV-lithography positive resists, SU-8
 - Hot-embossed polymers, Thermal imprinting,...

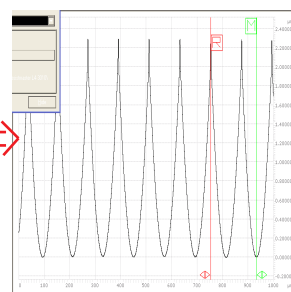
Replication tools for REFRACTIVE OPTICS:



Cylinderlens-shape DWL-written



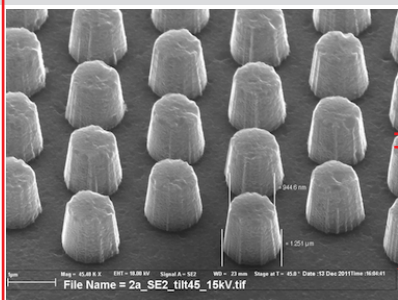
Ready-to-use Nickel hot-embossing stamp



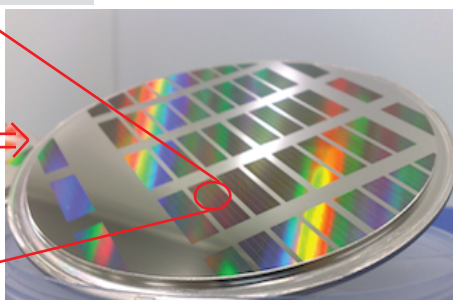
QC document: profilometer scan of lens shape

Scan Data
General Parameters
Program Name: Standard.mp
Scan Parameters
Scan Type: Standard Scan
Time/Date: 13:42:12 Tue Jul 17 2012
Data File Name: C:\Data\Standard\Standard.001
Scan ID: 500
Style Type: Radius: 2.5 µm
Location: 109337 µm, 103308 µm, 356.3°
Scan Length: 1000 µm
Resolution: 0.028 µm/sample
Style Force: 4 mN
Scan Length: 1000 µm
Samples: 36000
Duration: 120 sec
Mass Range: 65.5 µm
Profile: Hills&Valleys
Display Parameters
R. Cursor: 754 µm
R. Cursor Width: 0 µm
M. Cursor: 934 µm
M. Cursor Width: 0 µm
Cursor A-B: -2.28539 µm
Vertical Distance: -2.28539 µm
Cursor Distance: 180 µm
Display Range: Auto
Display Data Type: Raw
Data Processing
None

Replication tools for DIFFRACTIVE OPTICS:



SEM image: 1µm pattern on Si-wafer

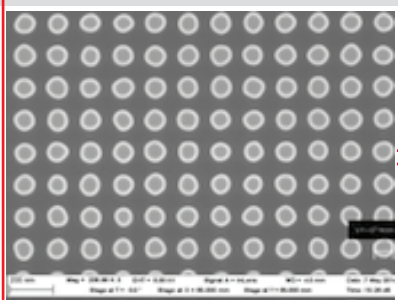


Ready-to-use Nickel hot-embossing stamp

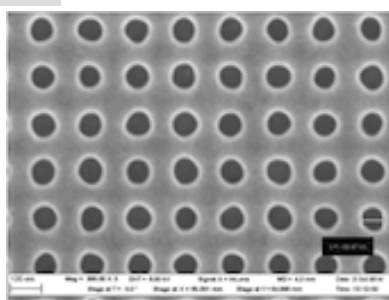


Ready-to-use Nickel injection-molding insert

Replication tools for NANO - OPTICS:



SEM image: 70nm pattern on Si-wafer

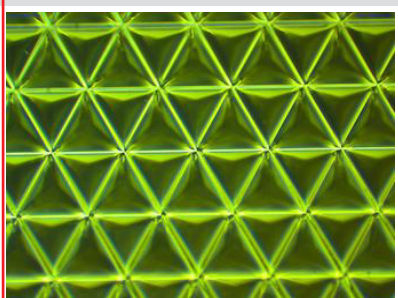


SEM image: 70nm pattern on Ni-insert

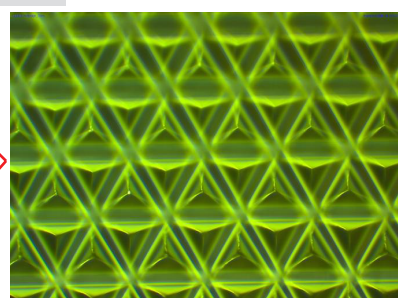


Ready-to-use Nickel injection molding insert

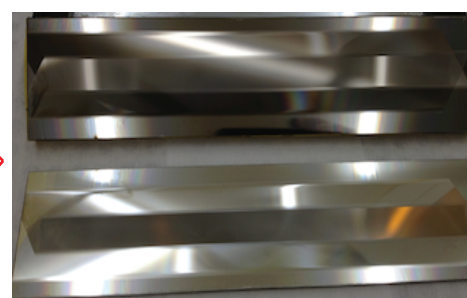
Replication tools for customer defined OPTICS:



Original pyramid pattern on master



Inverted pyramid pattern on Nickel-shim



Nickel-Master and Nickel-copy (roller-embossing)