micro resist technology GmbH
Köpenicker Straße 325
12555 Berlin
Germany
Tel.: +49 (0) 30 641670100
Fax: +49 (0) 30 641670200
info@microresist.de
www.microresist.com

mr-NIL212FC Series - Thin Film Resist Formulation for soft UV-NIL Featuring High Dry Etching Stability

The mr-NIL212FC Series is a purely organic and photo-curable NIL resist specifically developed for the manufacturing of sub-100nm feature sizes via soft UV-NIL in combination with PDMS based working stamp materials and low intensity light exposure sources. It features a strongly increased etching stability in RIE processes compared to mr-NIL210, whereas, all the well-established imprint features are still retained.

Application examples

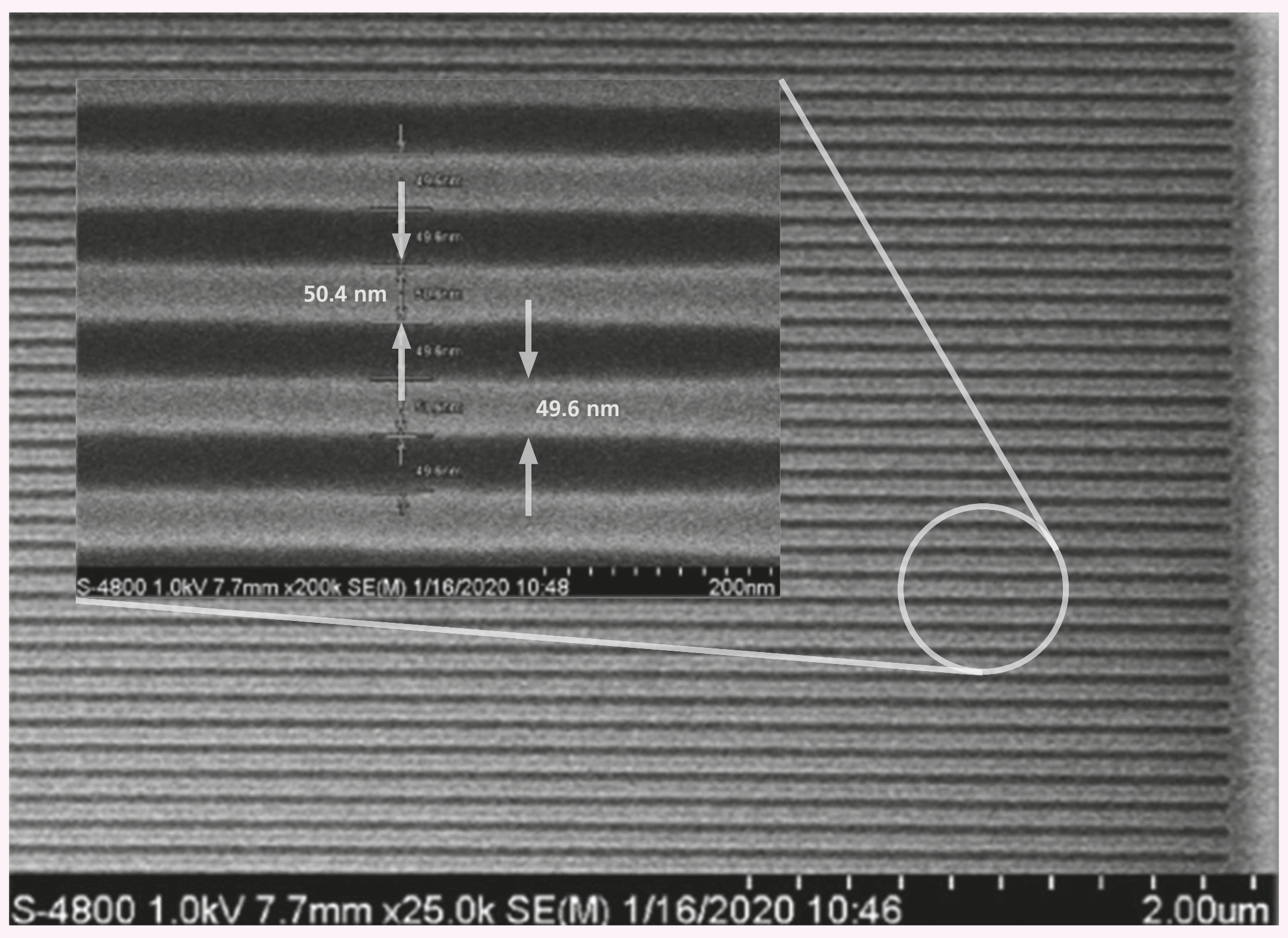

Fig. 1: SEM images of 50 nm L&S AR 1.4 imprinted on 6 inch Si_3N_4 using the SMILE^{TM} technology and GMN[1] working stamp, courtesy of SUSS MicroTec SE

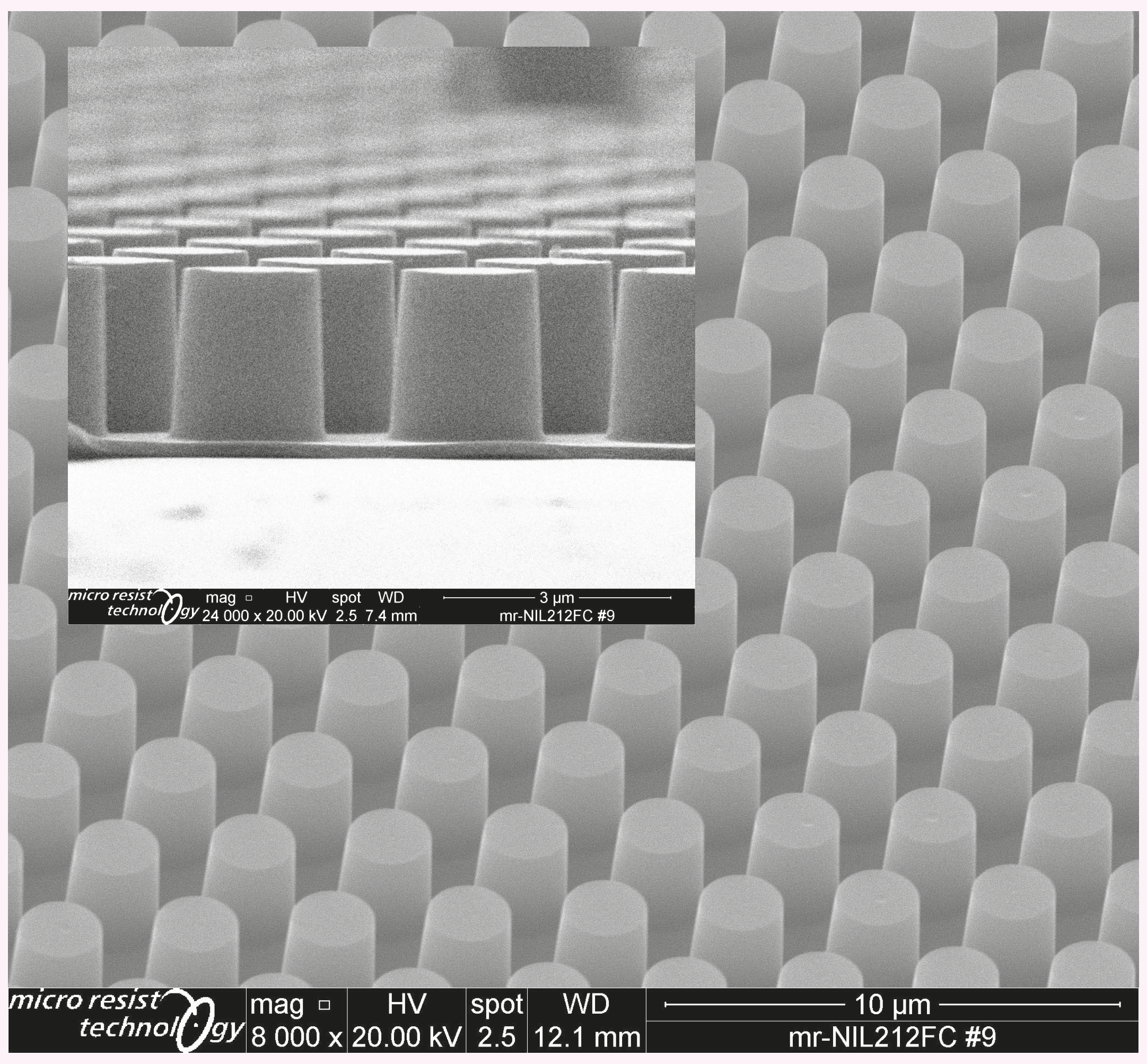

Fig. 2: SEM images of a micron sized pillar array (1.75 µm width, 2.20 µm height, RLT < 160nm) on 4 inch sapphire using GMN[1] working stamp

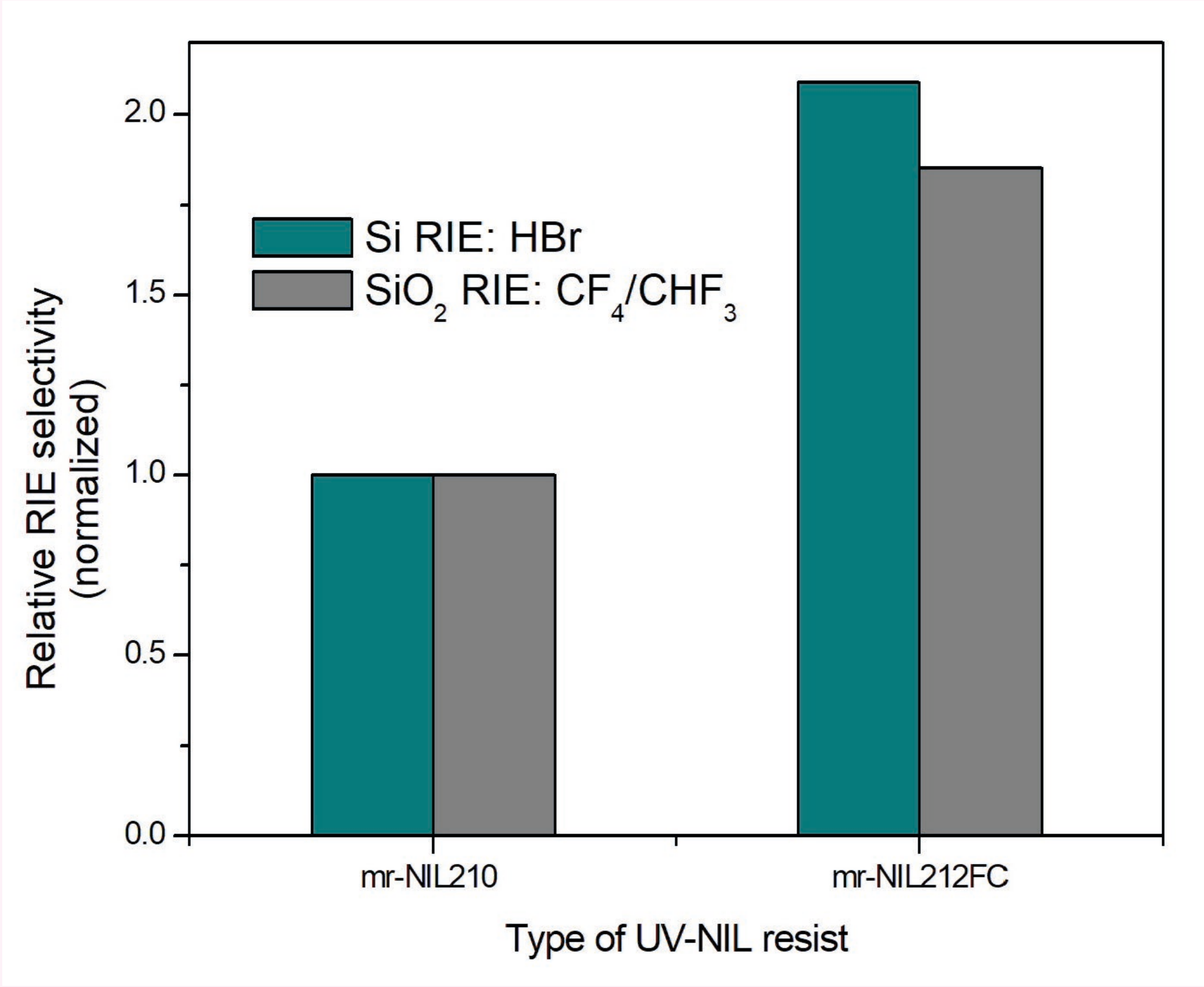

Fig. 3: Relative dry etching selectivity of mr-NIL212FC compared to mr-NIL210 for different substrate materials and RIE processes

Combination of soft UV-NIL with a subsequent lift-off process using mr-NIL212FC

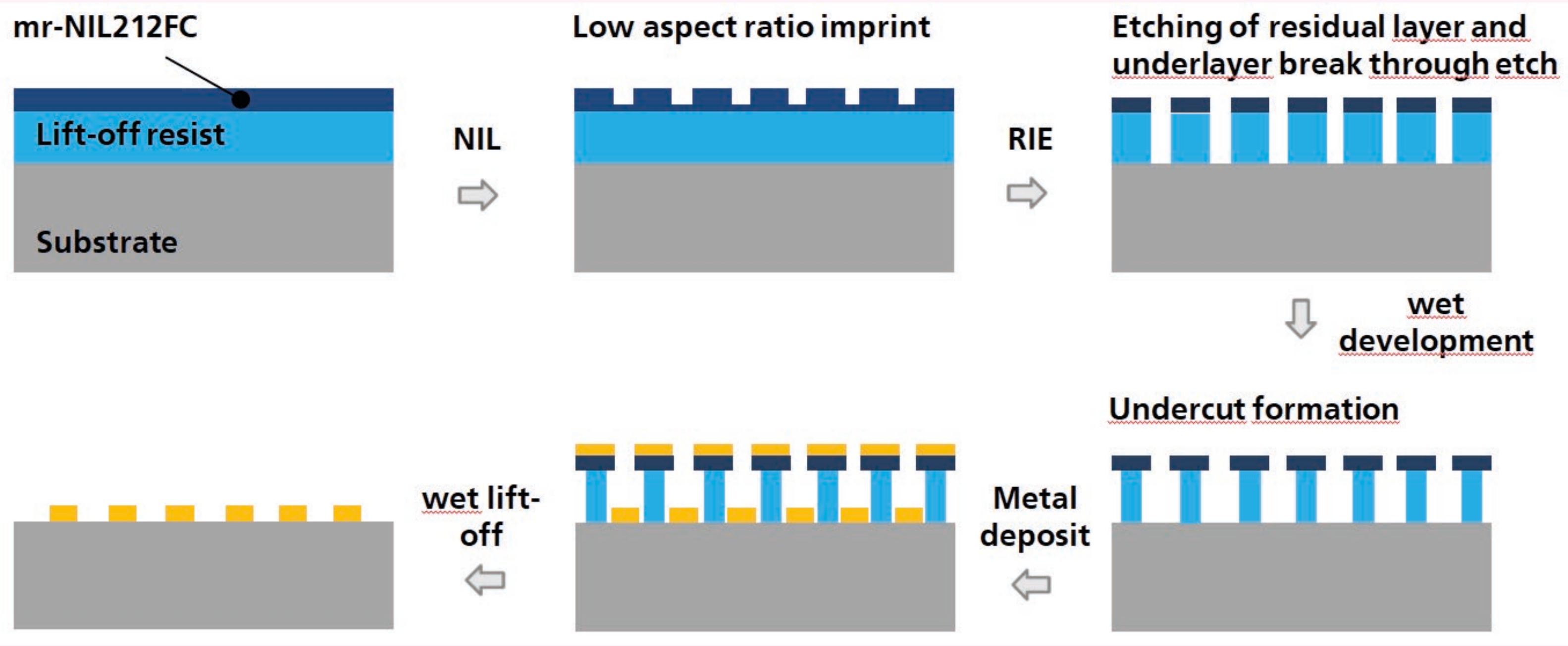

Fig. 4: general process scheme for the manufacturing of nm-scaled metal features with soft UV-NIL and lift-off

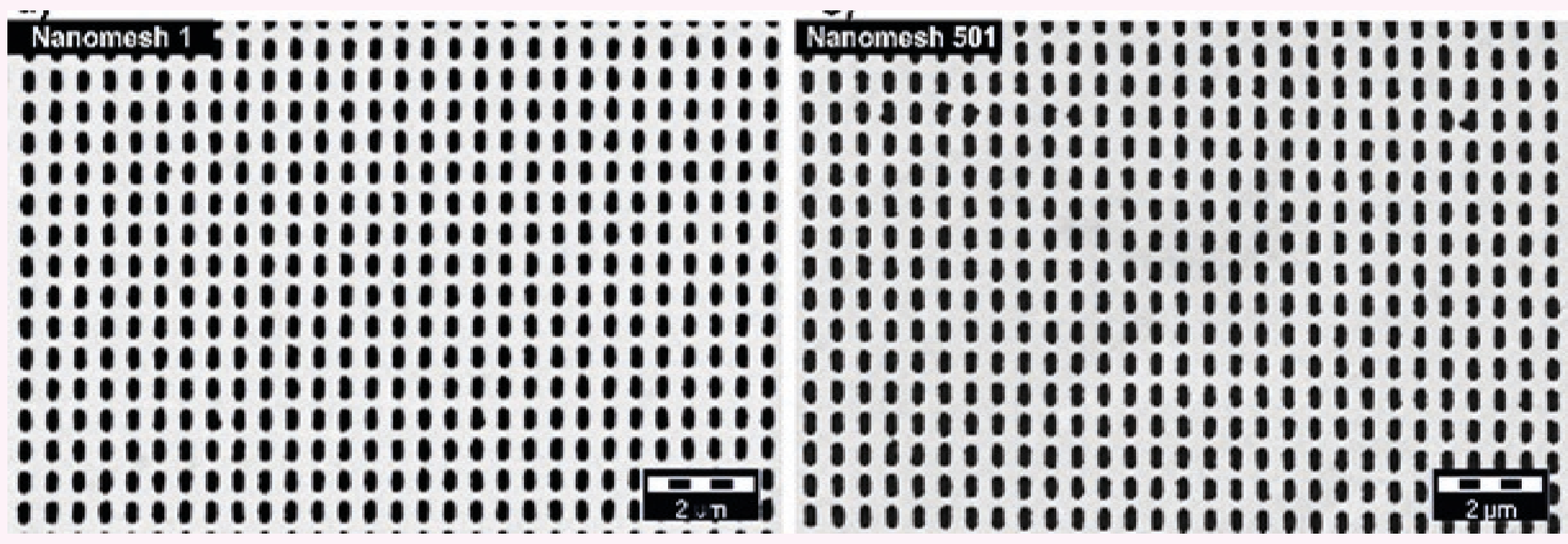

Fig. 5: SEM images of 1st and 501st fabricated metal nanomesh via soft UV-NIL and lift-off on LOR1A using one single PDMS working stamp

courtesy of Profactor GmbH[2]

Film characteristics

- Excellent film forming characteristics, film stability, film thickness uniformity, and storage stability over hours and days
- Standard ready-to-use thin film formulations available for realizing 100 nm, 200 nm, and 300 nm film thickness via spin-coating

Photo-Nanoimprinting (UV-NIL)

- Especially adapted to the manufacturing of sub-100nm feature sizes via soft UV-NIL with PDMS working stamps
- Outstanding compatibility to PDMS soft NIL stamps demonstrated featuring excellent residual layer control
- Featuring excellent photo-curing kinetics compatible to low intensity light exposure sources like in a standard mask aligner (below 40 mW cm^{-2})
- Photo-curing enabled for LED (up to 405 nm) and Hg bulb (broadband UV-illumination)

Dry etching characteristics and stripping performance

- Providing the RIE selectivity compared to mr-NIL210
- Facile removal of residual cured resist material by wet-chemical stripping or by oxygen plasma stripping

Lift-off process for

- Manufacturing of nm-sized metal features
- Pattern processes of amplification

[1] GMN working stamp material was kindly provided by OpTool, Sweden. [2] MJ Haslinger et al., 2020 Nanotechnology 31 345301

ls.21.09.20.01