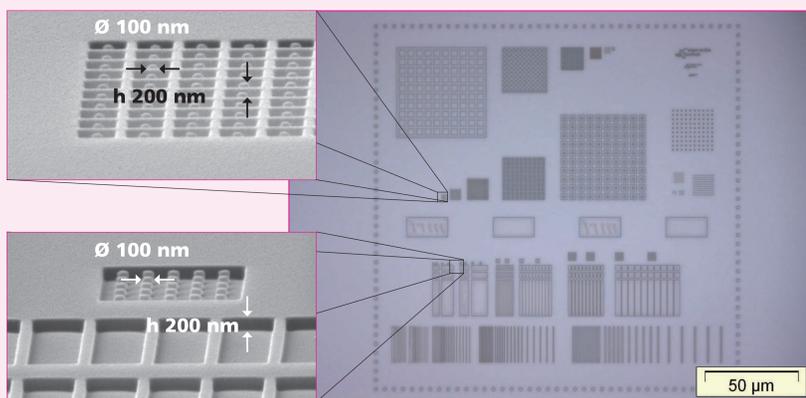


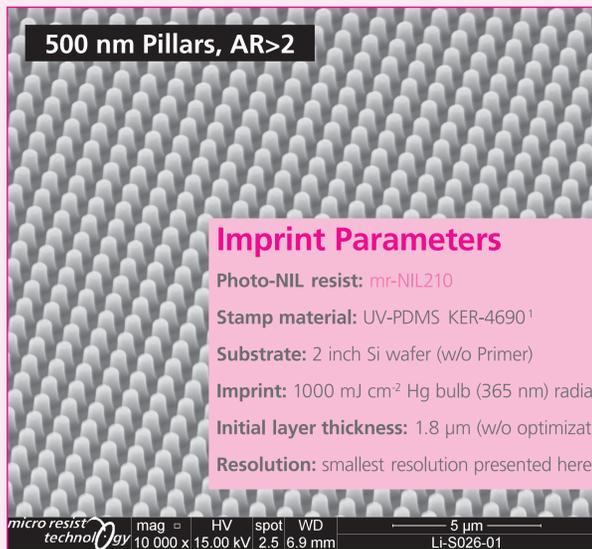
## mr-NIL210 - A New PDMS-Compatible Photo-Curable Nanoimprint Resist

mr-NIL210 is a purely organic, photo-curable NIL resist featuring excellent curing and nanoimprint performance in combination with PDMS soft stamp materials. The most important industrial key parameters are: optimized PDMS compatibility for extended stamp longevity, increased dry etching resistance, and excellent reproducibility enabling high volume production.

### Soft UV-NIL by e.g. capillary force imprinting



**Example 1** Imprint of miscellaneous nano- and micrometer test structures into **mr-NIL210** using a UV-PDMS<sup>1</sup> stamp.

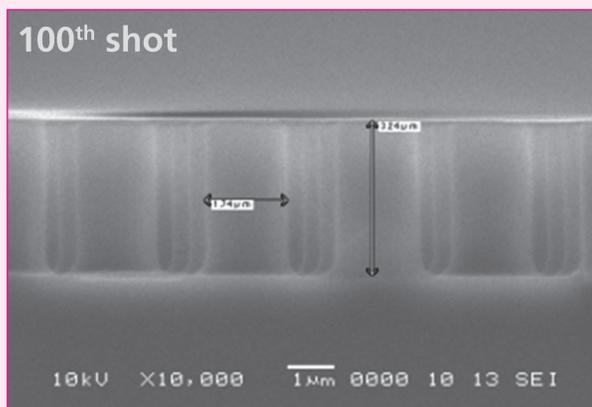


#### Imprint Parameters

Photo-NIL resist: **mr-NIL210**  
 Stamp material: UV-PDMS KER-4690<sup>1</sup>  
 Substrate: 2 inch Si wafer (w/o Primer)  
 Imprint: 1000 mJ cm<sup>-2</sup> Hg bulb (365 nm) radiation, no applied pressure  
 Initial layer thickness: 1.8 µm (w/o optimization of the residual layer)  
 Resolution: smallest resolution presented herein are 100 nm pillars

**Example 2** Large area imprint (50 x 50 mm) of sub micron pillars (500 nm in diameter, 1.12 µm in height) into **mr-NIL210** using a UV-PDMS<sup>1</sup> stamp.

### Industrial high throughput NIL using mr-NIL210 series



Imprint of PSS structures with minimized residual layer (<10nm). 100 subsequent imprints with one UV-PDMS KER-4690<sup>1</sup> working stamp.

### Etching Performance

Substrate	RIE TOOL	Gas [sccm]	Resist Etch Rate [nm/min]
Silicon	STS ICP	C <sub>4</sub> F <sub>8</sub> /SF <sub>6</sub> (90/30)	60
Borosilicate Glass	OI BP80	CHF <sub>3</sub> (20)	230
Sapphire	OI ICP180	BCl <sub>3</sub> /Cl <sub>2</sub> (90/10)	60
Titanium	OI System 100	SiCl <sub>4</sub> (18)	40
Cured Resist Ash Rate	GI Plasma Prep 5	O <sub>2</sub> (240)	63

Data courtesy of University of Glasgow, N. Gadegaard

### Film characteristics

- Brilliant film forming characteristics, film stability, film thickness uniformity, and storage stability over several hours
- Film thickness freely adjustable from sub 100 nm range up to several microns (Standard: 100 nm, 200 nm, 500 nm)

### Photo-Nanoimprinting

- Excellent imprint and photo-curing performance under ambient conditions as well as in the presence of air
- Outstanding compatibility to PDMS soft NIL stamps
- Suitable for the fabrication of micro- and nanoimprinted structures
- Enables high volume production by extended PDMS stamp longevity
- Photo-curing enabled also for LED (up to 405 nm) beside Hg bulb

### Dry etching characteristics and stripping

- Excellent etching characteristics for many demanding substrates like sapphire, silica, etc.
- Facile removal of residual cured resist material by wet-chemical stripping or by oxygen plasma stripping

<sup>1</sup> UV-PDMS was provided by Shin-Etsu Silicones and UV-PDMS KER-4690 A/B was used for the fabrication of all mentioned NIL stamp copies.