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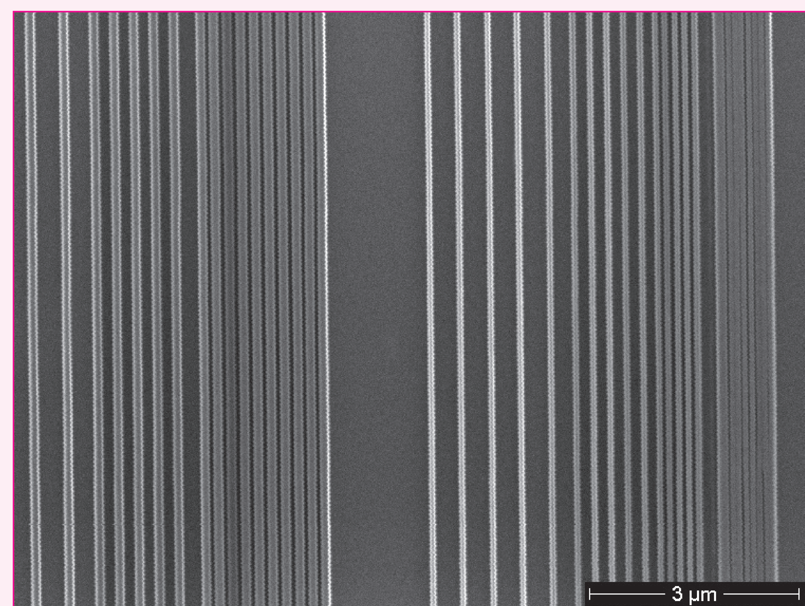
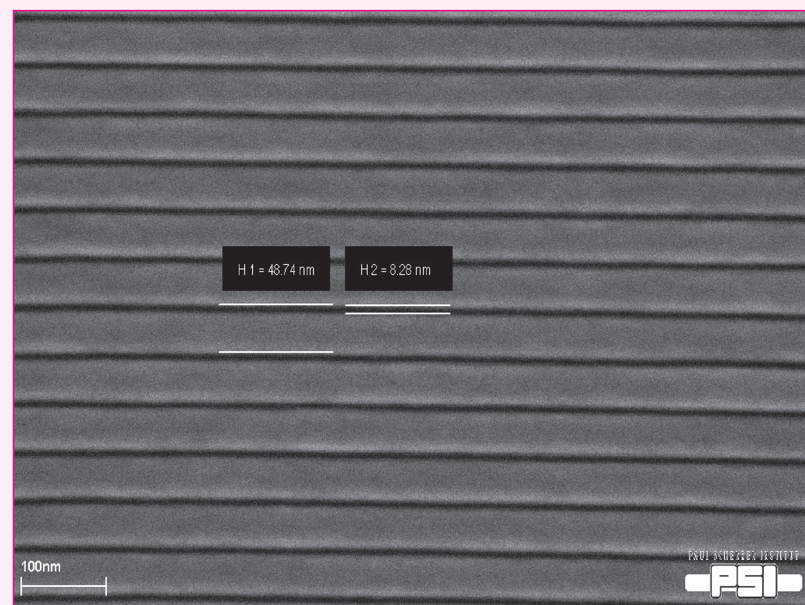
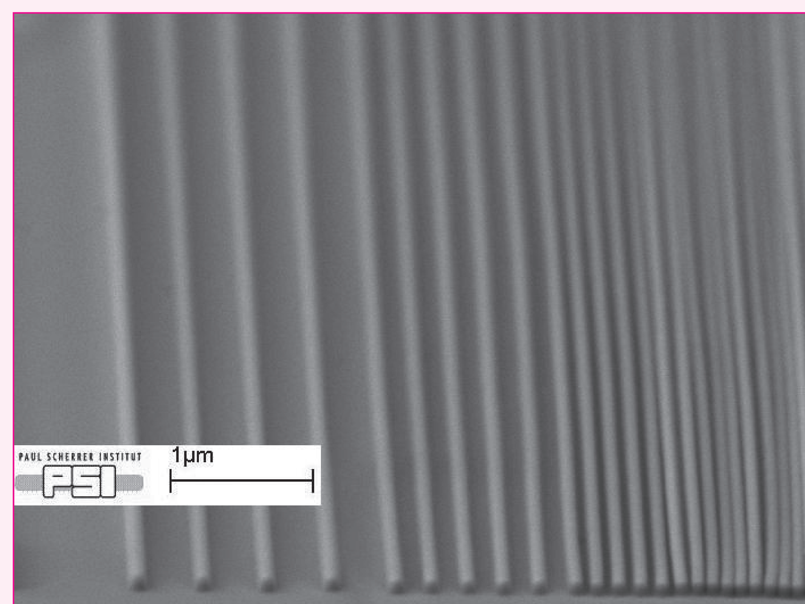
New Thermoplastics for Nanoimprint Lithography

mr-I 7000R and mr-I 8000R – Thermoplastics with Built-in Release Properties

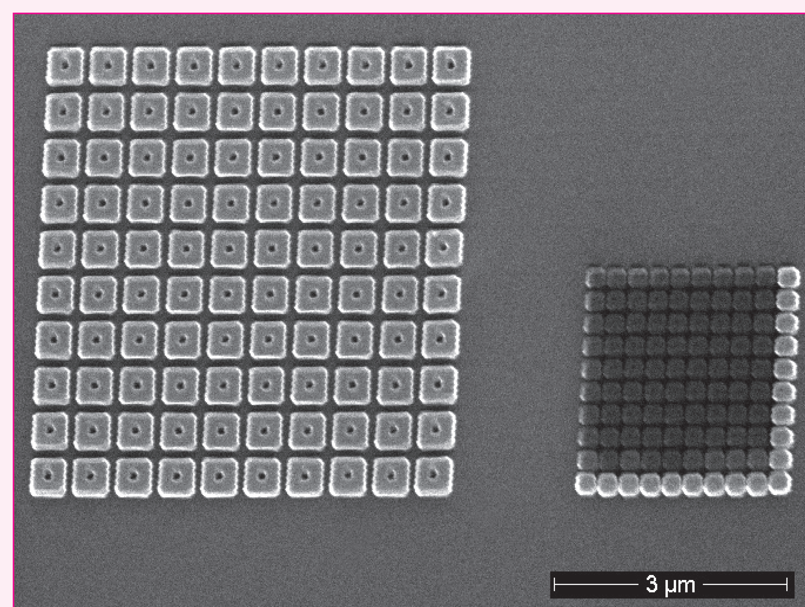


75 nm and 100 nm lines imprinted in mr-I 8030R, varying pitch


12 nm trenches, 50 nm pitch, imprinted in mr-I 7000R (Courtesy of Eulitha AG and Paul Scherrer Institute)



50 nm lines imprinted in mr-I 7030R (Courtesy of Paul Scherrer Institute)



75 nm and 100 nm squares imprinted in mr-I 7030R

mrt logo imprinted in mr-I 7030R

- **Tailor-made for thermal nanoimprint lithography**
- **Easy demoulding, efficient release force reduction**
- **Longer life-time of anti-sticking layer on the mould**

Unique Features

- Excellent properties for thermal NIL
  - Short cycle times due to fast polymer flow
  - Sub-20 nm resolution
  - Low residual layer thickness
  - Low release forces
- Longer life-time of anti-sticking layers on the mould
- High plasma etch resistance comparable to novolak-based photoresists

Applications

- Etch mask for pattern transfer
- Fabrication of nanopatterns for
  - High brightness LEDs
  - Photonic crystals
  - Patterned media
  - Nano-optical devices, sub-wavelength optical elements
  - Microfluidics, bio applications

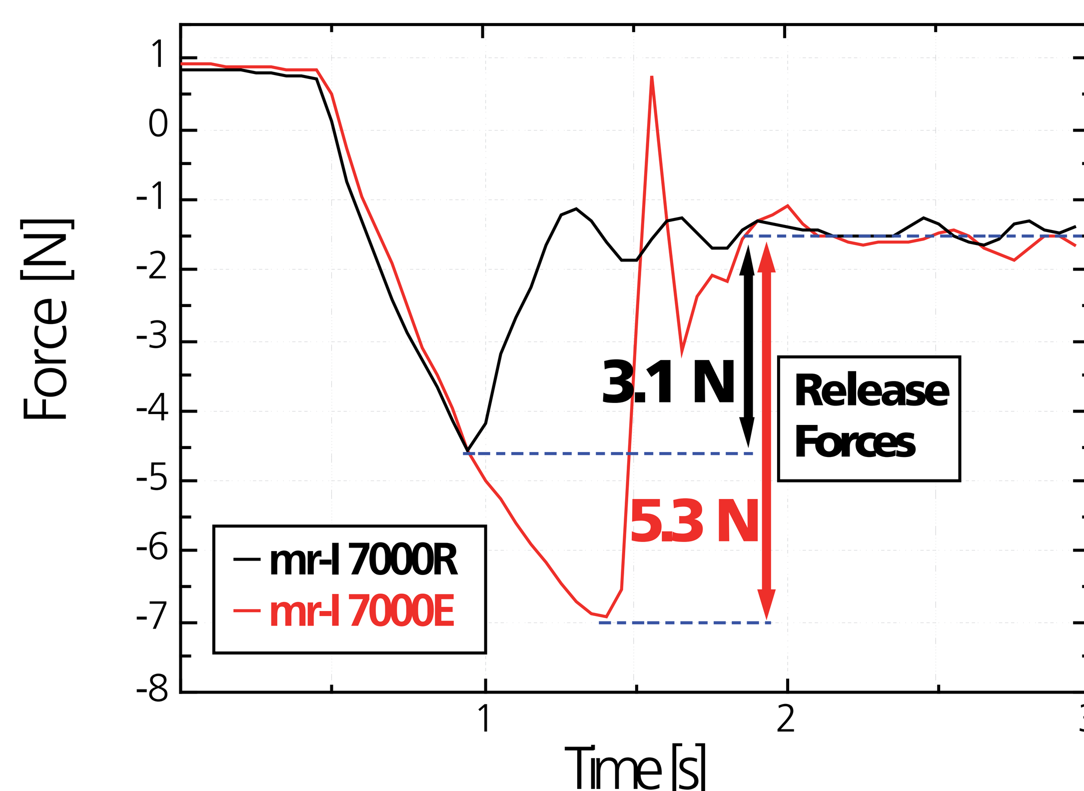
Technical Data

Parameter *	mr-I 7000R	mr-I 8000R
Glass transition temperature T_g	50 °C	105 °C
Imprint temperature	120 – 140 °C	150 – 180 °C
Imprint pressure	20 – 40 bar	20 – 40 bar
Ready-to-use solutions for standard film thicknesses ** (3000 rpm)	mr-I 7010R 100 nm mr-I 7020R 200 nm mr-I 7030R 300 nm	mr-I 8010R 100 nm mr-I 8020R 200 nm mr-I 8030R 300 nm

* Processing guidelines available on request

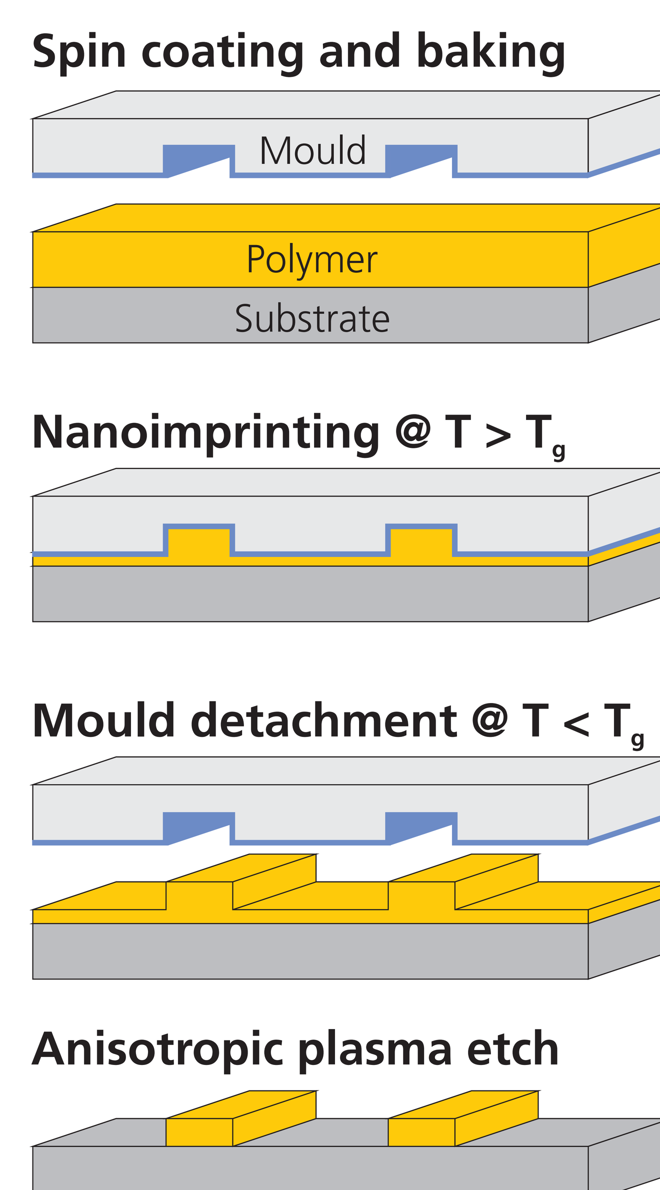
** Further film thicknesses available on request

Release Force Reduction



Forces during mould release: comparison between mr-I 7000R to its non-modified analogue mr-I 7000E

Process Flow



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