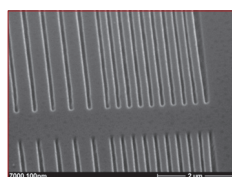
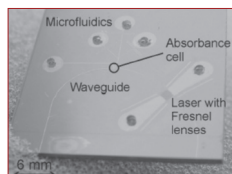


# Nanoimprint Materials News

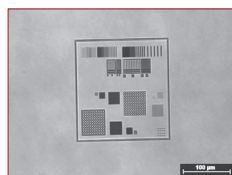
*micro resist technology* has developed several polymers for thermal nanoimprint lithography (hot embossing) as well as for UV-based nanoimprint lithography allowing the customer to choose advanced materials fitting to their specific processes. All these nanoimprint polymers are provided as reasy-to-use solutions customised for specified film thickness.



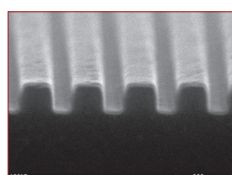
Lines imprinted in mr-I 7000E, 100 nm trenches, 300 nm and 500 nm pitch, residual layer thickness < 10 nm



Complete lab-on-a-chip device for absorption measurements, all components imprinted in one layer of mr-I T85 (Courtesy of MIC / TU Denmark)



Uniform filling of patterns with different size imprinted in mr-I 9000E (100 nm to 2 µm)



200 nm lines, 100 nm trenches imprinted in mr-I 9000M after annealing to 220 °C -> thermally stable patterns, no reflow!

## Thermoplastic polymers for thermal nanoimprint lithography

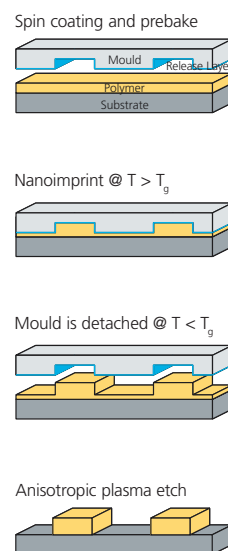
- ✓ **mr-I 7000E ( $T_g = 60\text{ °C}$ ) and mr-I 8000E ( $T_g = 115\text{ °C}$ ) – Etch mask for pattern transfer**

The excellent imprint behaviour of these materials enables imprinting processes with low imprint pressure, short cycle time and very low residual layer thickness. Further unique features are excellent film quality of the spin-coated films, attainable smallest feature size of at least 50 nm and plasma etch resistance superior to PMMA. mr-I 7000E and mr-I 8000E differ in their imprint temperature due to different glass transition temperature  $T_g$ , so that the user can choose the specific polymer that meets best the thermal requirements.

- ✓ **mr-I T85 ( $T_g = 80\text{ °C}$ ) – Permanent applications in lab-on-a-chip, microfluidics and micro-optical components**

The main features of this unpolar thermoplastic are excellent UV and optical transparency, high chemical stability, high resistance to acids, bases, and polar solvents, beneficial flow behaviour allowing low imprint pressure, and high plasma etch resistance. Feature sizes can be imprinted ranging from sub-100 nm to 100 µm.

## Process



# Thermoplastic Polymers

## Thermosetting polymers for nanoimprint lithography

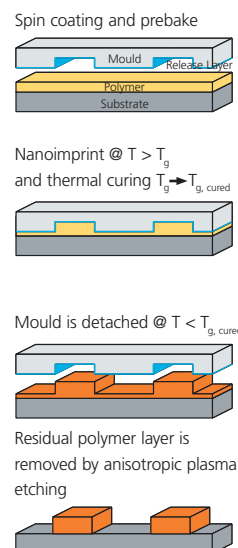
- ✓ **mr-I 9000E – Etch mask for pattern transfer**

This thermosetting polymer combines several outstanding characteristics ideal for the application in pattern transfer processes: low imprint temperature, short cycle time due to nearly isothermal imprint process, and very low residual layer thickness. Further features are excellent film quality, attainable smallest feature size at least 50 nm and plasma etch resistance superior to PMMA.

- ✓ **mr-I 9000M – Permanent applications – Isothermal imprint process**

The thermoset mr-I 9000M was designed for permanent applications with high thermal stability requirements. After thermal curing during the imprint the patterns are stable up to 260 °C. The mould release at the imprint temperature enables an isothermal imprint process. The beneficial flow behaviour allows simultaneous imprinting of nano and micropatterns.

## Process



# Thermosetting Polymers