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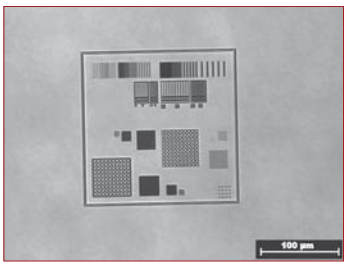
Thermosetting Polymers for Nanoimprint Lithography

mr-I 9000E – Thermoset for Pattern Transfer



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

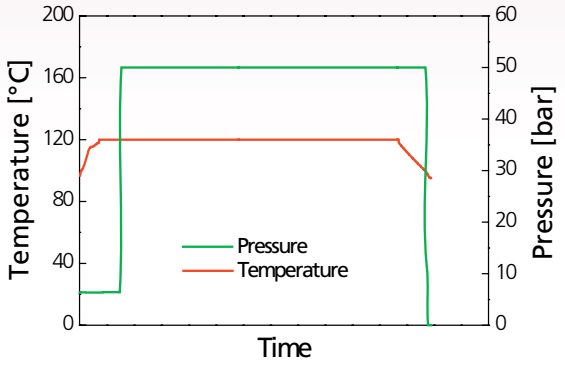
Unique features

- ✓ Application by spin coating, film thickness 100 – 300 nm
- ✓ Short imprint cycle times
- ✓ Thermal curing during imprint
- ✓ Very low residual layer thickness down to 5 nm
- ✓ Excellent pattern transfer fidelity
- ✓ Residue-free removal by oxygen plasma etching

Applications

- Coating of various substrate materials (e.g. Si, SiO_2, Al)
- Mask for pattern transfer processes
- Single and multilayer systems

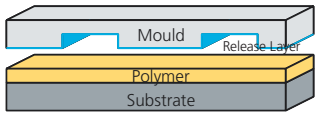
Nanoimprint process cycle



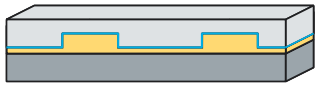
Imprinting temperature 120 °C,
Mould detachment at 100 °C

Process Flow

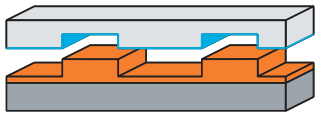
Spin coating and prebake



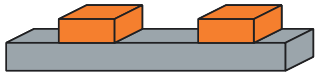
Nanoimprint @ $T > T_g$ and thermal curing $T_g \rightarrow T_{g,\,cured}$



Mould is detached @ $T < T_{g,\,cured}$



Residual polymer layer is removed by anisotropic plasma etching



mr-I 9000M – Thermoset for Micro and Nanofabrication

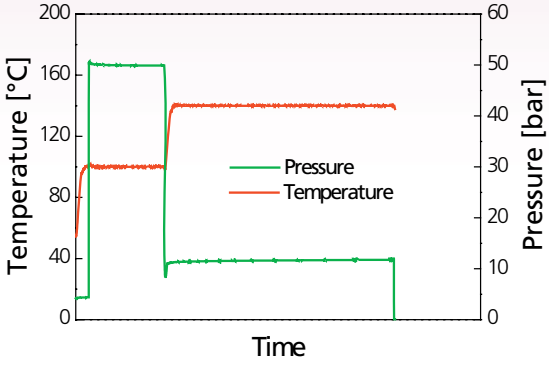
Unique features

- ✓ Application by spin coating, film thickness 300 nm – 1 µm
- ✓ Simultaneous imprint of nano and micropatterns
- ✓ Thermal curing during imprint
- ✓ Isothermal mould detachment (no cooling phase)
- ✓ Excellent pattern transfer fidelity
- ✓ Thermal stability of imprinted patterns up to 260 °C

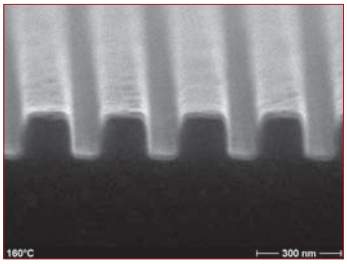
Applications

- Coating of various substrate materials (e.g. Si, SiO_2, Al)
- Fabrication of micro and nanopatterns for permanent applications
- Micro and nanopatterns with high thermal stability requirements
- Single and multilayer systems

Nanoimprint process cycle



Two-step process:
Imprinting temperature 100 °C,
Thermal curing at 140°C,
Isothermal mould detachment at 140 °C



100 nm trenches, 300 nm pitch imprinted in mr-I 9000M

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