



**PFAS-free products -
we pay attention**

**micro resist
technology**
member of **tak** group

Materials for Inkjet Printing

**NEXT
GENERATION
PRODUCTS**



Ready-to-use high-performance, inkjetable materials for coating and direct patterning

- Compatible with commercial inkjet printing equipment
- Can be patterned using optical lithography or nano imprinting
- Adaptable viscosities
- Stable single drop on demand (DoD) generation
- UV curable materials
- RoHS compliance
- Manufacture according to ISO 9001 and ISO 14001
- Broad range of applications: optical components, packaging, etch masks ...

- Made in Germany -

micro resist technology GmbH

Gesellschaft für chemische Materialien spezieller Photoresistsysteme mbH

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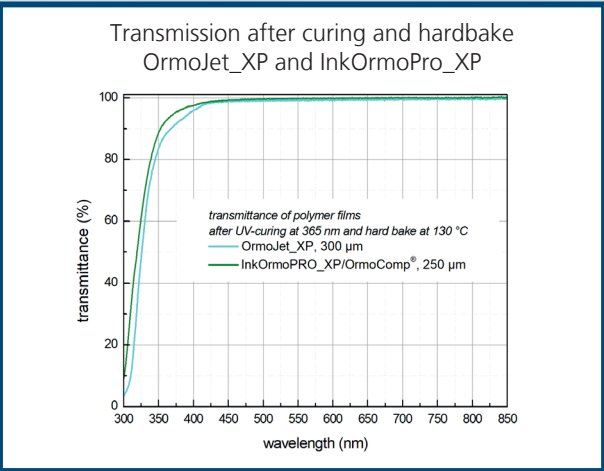
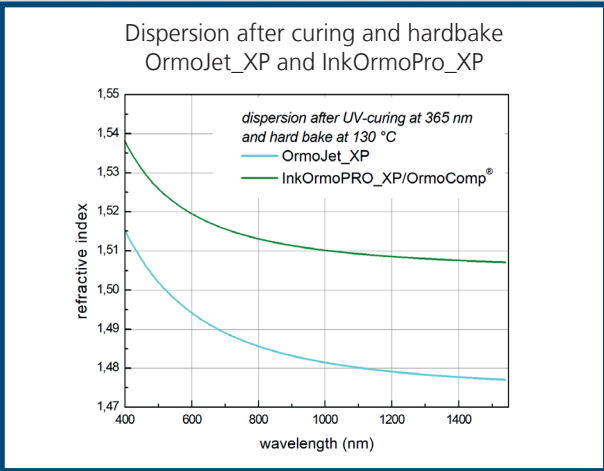
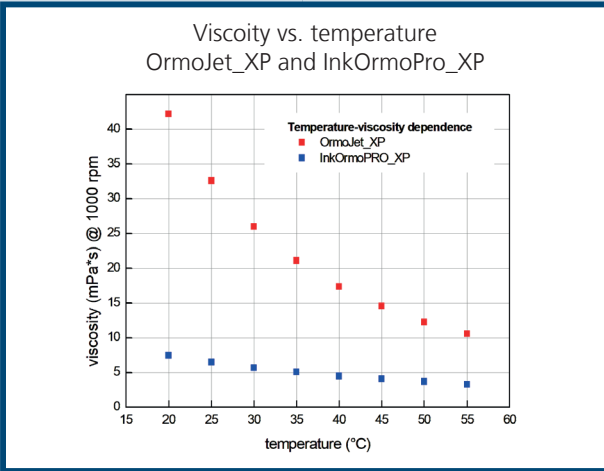
www.microresist.com

Inkjet Materials

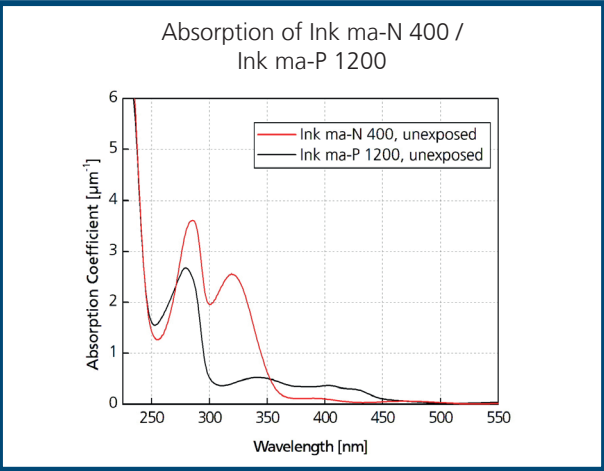
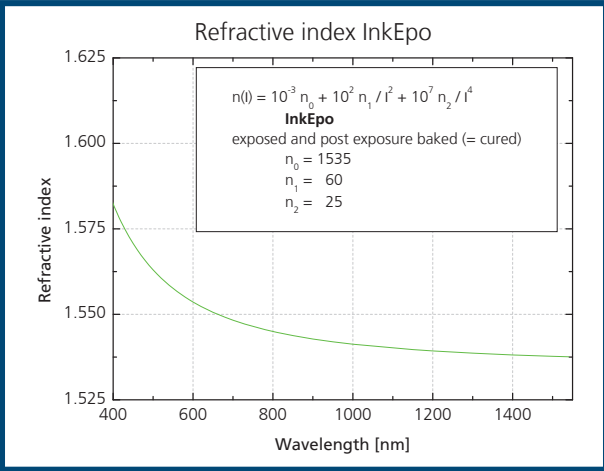
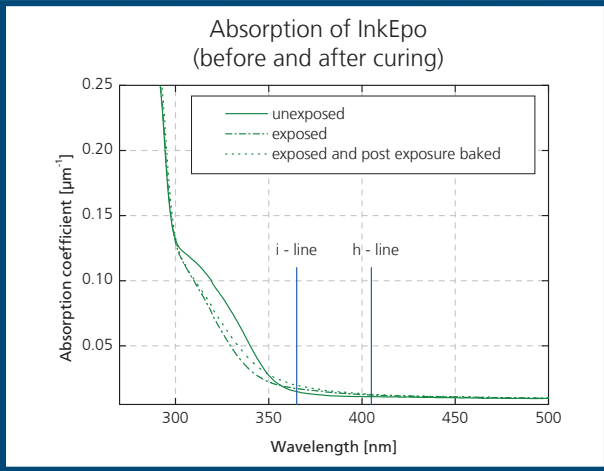
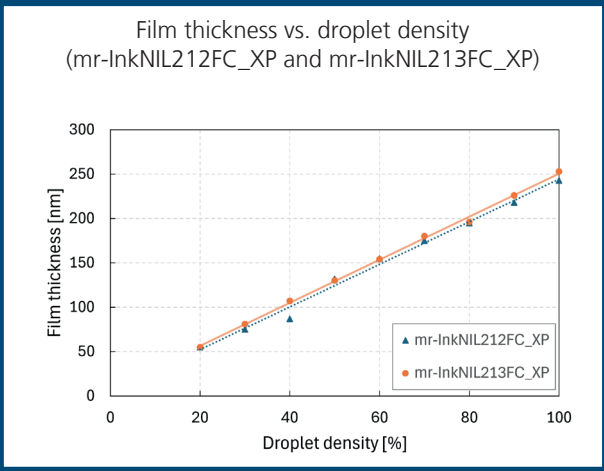
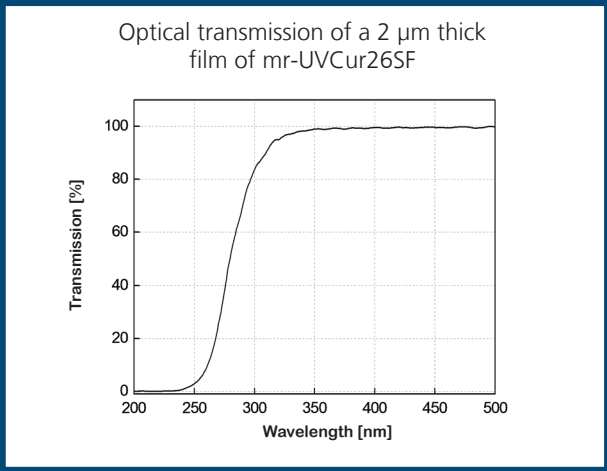
High performance materials for diverse applications in inkjet printing

Properties of the liquid materials									
	Hybrid polymers		NIL materials			Negative resists			Positive resist
Parameter	InkOrmoPro_XP	OrmoJet_XP	mr-UVCur26SF	mr-InkNIL212FC_XP	mr-InkNIL213FC_XP	InkEpo series	Ink_ma-N 400_XP	InkNovolac_XP	Ink_ma-P 12000_XP
Process application (patterning)	by direct patterning or UV moulding		by imprinting			by direct patterning or UV-lithography		by direct patterning	by direct patterning or UV-lithography
Viscosity @ 25 °C [mPas] ¹⁾	7	35	15.0 ± 0.5	4 - 10	4 - 10	5 / 8 / 12 / 25	12	12	12
Solvent based	yes	no	no	yes	yes	yes	yes	yes	yes
Photocuring spectral sensitivity [nm]	300 - 410	300 - 410	365 - 405	365 - 405	365 - 405	365 (i-line)	300 - 380	not light sensitive	330 - 450
Surface tension [nN/m]	48	41	32	30 - 45	30 - 45	48	48	48	48
Volume shrinkage [%]	6 - 8	3 - 4	7 - 8	7 - 8	7 - 8	2 - 3	< 1	/	/
Oxygen sensitivity during UV-curing	no	yes	yes	no	no	no	no	/	no
PFAS-free	yes	yes	no	yes	yes	yes	yes	yes	yes

Properties of the cured materials		
Parameter	InkOrmoPro_XP	OrmoJet_XP
Refractive Index @ 589 nm	1.52	1.49
Thermal stability	up to 270 °C	up to 270 °C
Abbe number	47	39
dn/dT (589 nm) [10 ⁻⁴ K]	-2.0	t.b.d
CTE (20 - 150 °C) [ppm/K]	150	180
Young's modulus [GPa] @ 1Hz, 25°C, DMA	2	t.b.d.
Shore D Hardness*	75	75
Application examples	optical elements, micro fluidics	



¹⁾ other viscosities on request



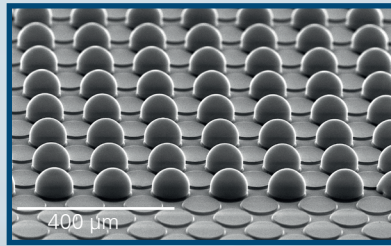
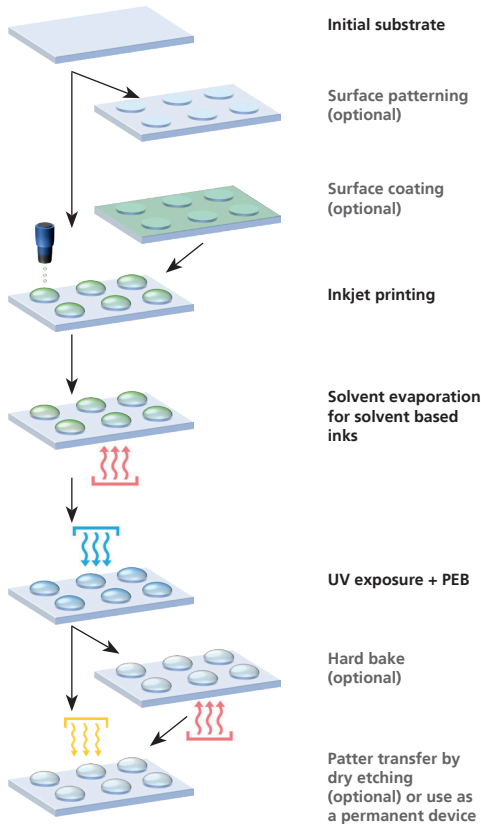
Manufactured in Berlin, Germany



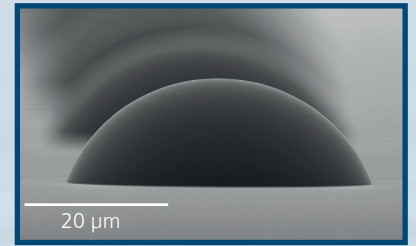
enabled by ready-to-use formulations

Process flow

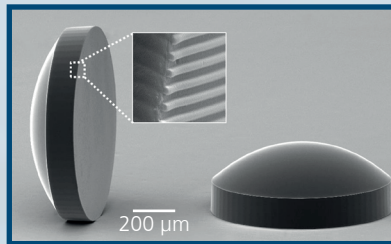
Manufacture of 2.5D structures e.g. micro lenses



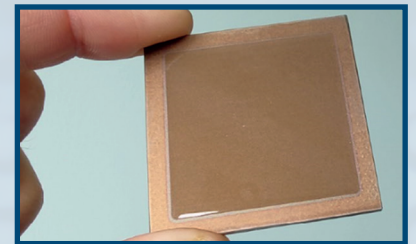
OrmoComp® lenses generated by inkjetting on OrmoComp® platforms with 100 µm diameter as a confining pattern (Courtesy of EPFL/Switzerland)



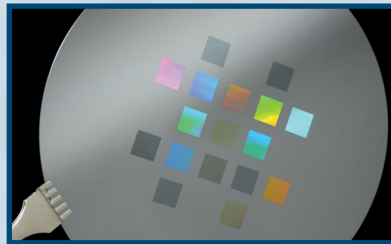
InkEpo lens with Ø45 µm on surface-treated substrate



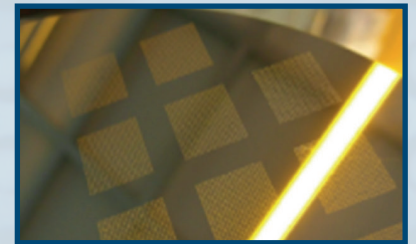
Macro lens with nanosized surface topography



Inkjet printed thin layer on metal substrate

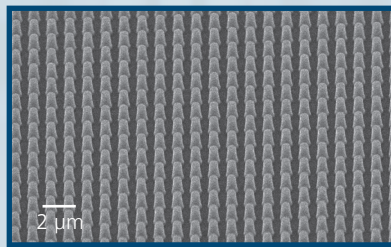
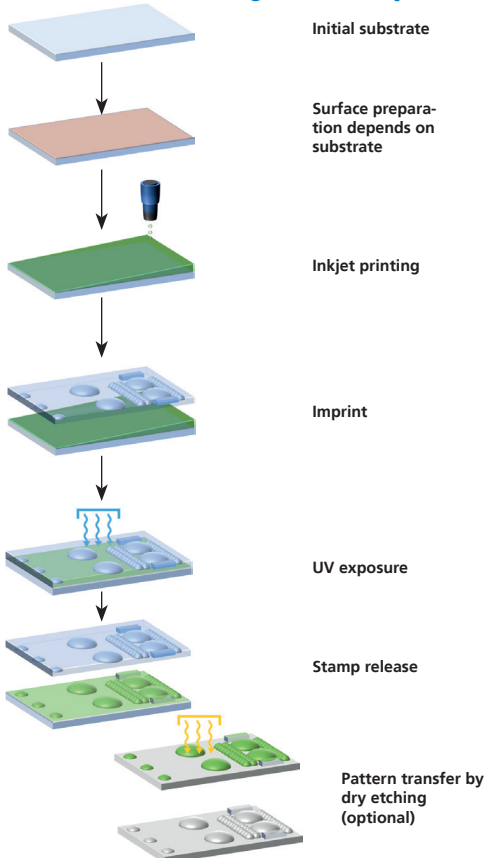


Area specific material demand showcased by a Si master test pattern (height 160nm, material demand between 70-110 nm).

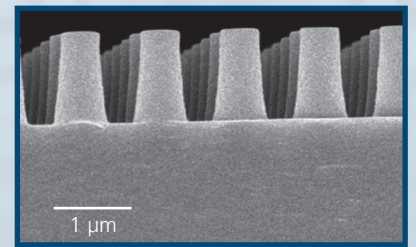


Discrete areas of mr-UVCur26SF droplets inkjet dispensed on a 6" Si wafer matching the template architecture for Step&Repeat NIL (Courtesy of FhG IISB, Germany)

Process flow Pattern generation by NIL



Roll2Roll UV-NIL imprinted dense pillar design, 500 nm in diameter, aspect ratio > 2, deposition of mr-UVCur26SF via inkjet dispensing at room temperature. (Data courtesy of IMRE, Singapore)



Spherical lens, 2 mm diameter, made of hybrid polymer



Patterned SiN using selective material deposition via inkjet and subsequent NIL+etch (Courtesy of Fraunhofer ENAS, Germany)

Materials for inkjet printing

Unique features & applications

Hybridpolymers

InkOrmoPro_XP

- Solvent diluted version of industry-proven OrmoComp®
- Standard viscosity 7mPas, other viscosities on request

OrmoJet_XP

- Ultra-low viscosity hybrid polymer, solvent-free
- Improved reliability
- Yellowing Index <5 (D65/10) after 1000h@130°C
- Reduced shrinkage

Applications

- Direct printing of micro lenses
- Homogenous coating or grey scale coating
- Filling of cavities

NIL-materials

- Organic, photo-curable nanoimprint resist
- Compatibility to various mold materials e.g. Ni, Si, OrmoStampFF®, flexible stamp materials
- High stability of the cured patterns
- Excellent dry etch resistance for pattern transfer
- Low viscosity (15 mPas), solvent free or solvent based
- Good adhesion to plastic foil substrates

Applications

- Step&Repeat NIL process
- Large-area nanostructuring of flexible substrates
- Continuous roll-to-roll (R2R) Photo-NIL process
- High volume manufacturing of antireflective coatings, (super) hydrophobic patterns on flexible substrates
- Wire-grid polarizers

Negative resists

- Solvent diluted ink solutions
- Various viscosities available
- Direct printing of patterns or patterning of printed layer using UV lithography
- Excellent thermal, mechanical, and chemical stability of cured patterns
- InkEpo - high transparency to near UV & visible light

Applications (InkEpo)

- Single micro-lenses and micro lens arrays
- Spacer, or homogeneous protecting layers
- Glue for bonding applications
- Filling of cavities

Applications (Ink ma-N)

- Patterns for dry etch pattern transfer
- Protecting coating

Positive resists

- Solvent diluted ink solutions
- Various standard viscosities
- Direct printing of patterns or patterning of printed layer using UV lithography
- High dry and wet etch resistance

Applications

(Ink ma-N, InkNovolac)

- Patterns or layers for dry etch pattern transfer
- Protecting coating

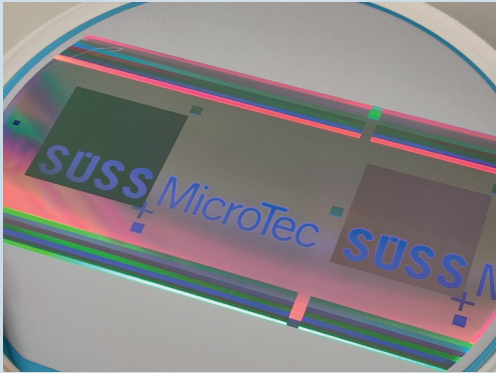
Please note:

⇒ Our inkjet materials have been successfully tested with a range of common inkjet printheads. Please contact us directly for more information.

Materials for Inkjet printing

Highlights and inspirations

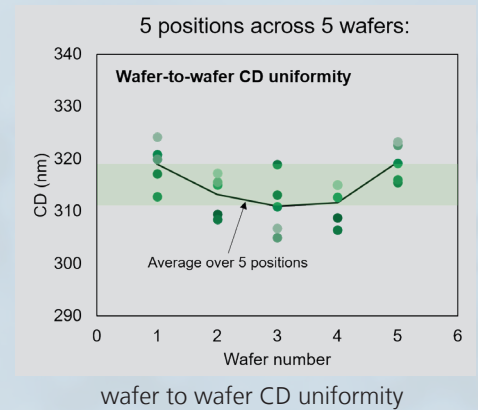
Highlight 1: Patterning of SiN using inkjet NIL + Etch



Etched SiN wafer (courtesy of SUSS)

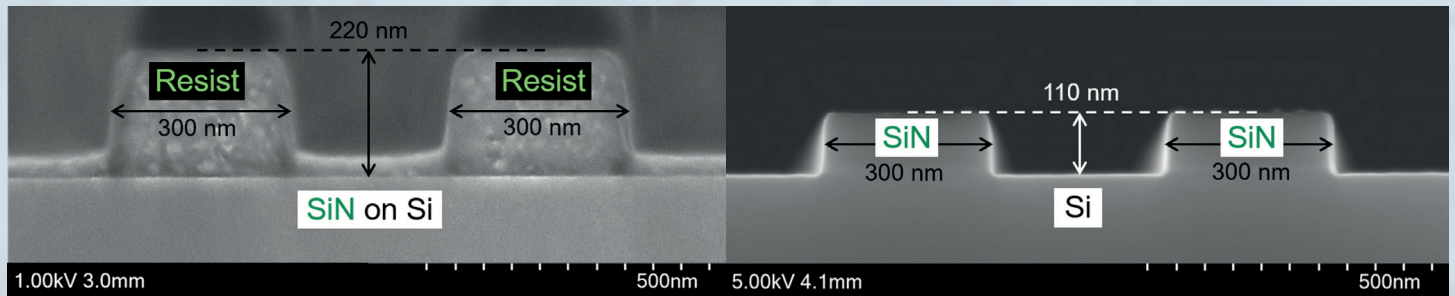
Main features

- ⇒ Selective deposition of NIL resist via inkjet (film thickness $139\text{nm} \pm 2.6\%$)
- ⇒ Imprinting using SMILE technology on 150mm Si wafer (100nm SiN layer)
- ⇒ Etched SiN with selectivity 0.8



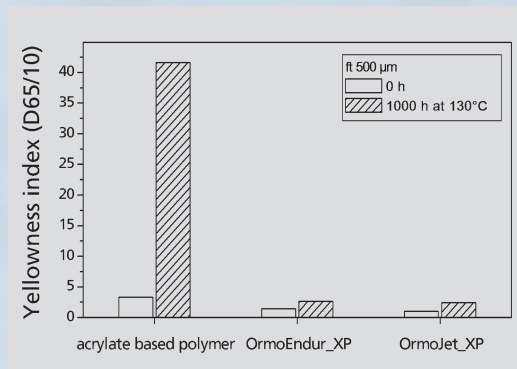
Experimental results:

(courtesy of TU Chemnitz/ZFM & SUSS)



SEM image of the imprinted pattern (left) and the resulting etched grating (right).

Highlight 2: Long term stability OrmoJet_XP



Main features OrmoJet_XP

- ⇒ Solvent-free material designed for permanent applications with reduced shrinkage
- ⇒ PFAS free
- ⇒ Next-generation hybrid polymer with low yellowness index and preserves optical performance, after 1000 h of aging at 130°C

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