

APPLICATION NOTES

Molecular ink R01

PROCESS OVERVIEW



Forming is exclusive to 3D parts (In-Mold Electronics) and must be performed between the drying and the sintering of the ink. MINK should not be passivated before the sintering step is completed. Extra layer of ink may prevent the metallization process from happening.

SCREEN PRINTING GUIDELINES

Printing Mesh: Polyester 355 Thd/in. or Stainless steel 400 Thd/in.

Squeegee Duro > 85 (Shore A)

Emulsion thickness < 6 μm

2 screen printing passes of MINK-RO are recommended when higher thermoforming elongation is required.

INKJET PRINTING

Both the silver carboxylate content (10-50%) and the viscosity of the MINK can be tuned for inkjet printing. MINK is compatible with the SUSS PiXDRO and FUJIFILM Dimatix inkjet printing systems.

DRYING PROCESS

It is recommended to remove solvent from the traces prior to metallization. After printing the MINK-RO, trace can be flash dried under UV light.

- Broadband UV light (Dymax flood system, 50-200mW/cm², 0.5-2 minutes) as well as LED arrays (365, 385, 395, 395 and 405nm, 200-500mW/cm², 0.25-1 minute) can be used to rapidly dry remove solvent from the samples.
- Secondary drying can be carried out in a conveyor oven (2 min at 130°C).
- Printed and dried circuits can be stored 14 days before being thermoformed and/or sintered.

SINTERING PROCESS

IPL sintering

For 3D formed films, Path and exact photo sintering recipe depends on sample geometry and generally requires multiple flashes.

- Best practice is to Pre-treat the MINK circuit in a box oven for 2 hours at 130°C.
- Most used Photo sintering recipe consists in 2 flashes of 800 msec each. Flash energy can vary between 15 J/cm² and 25 J/cm² and must be determined for each different construction.
- For flat circuits, the IPL process is compatible with fast and high-volume manufacturing (roll-to-roll equipment's) as it lasts only few seconds. The MINK was tested on flat circuits with the PulseForge 1300, Setup: 2.0-3.2 mJ/cm²; Voltage: 280-320V, Pulse width: 1500-6000 μs

Heat sintering

Parts can also be placed in a box oven and thermally sintered at 130-140°C for extended periods of time (60-180 minutes). The process is much slower but more uniform for 3D parts. Similar properties are achieved with both sintering technics (IPL or heat).