

Roll-to-Roll – R2R

Large-area micro- and nanostructuring
of foil-based materials for industrial production

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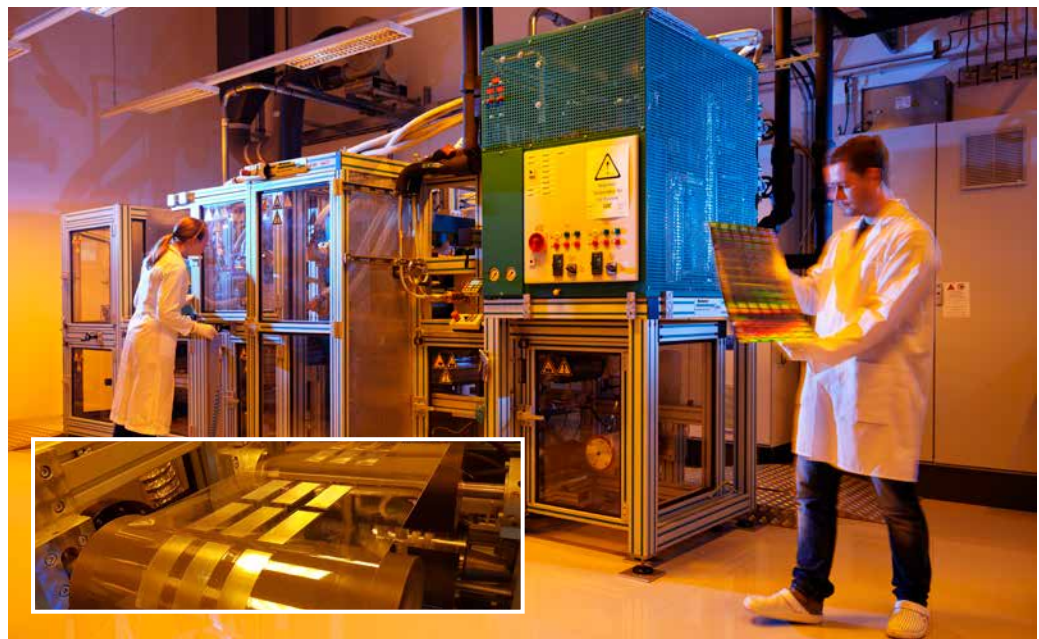
Hybrid Electronics and
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The utilisation of roll-based imprinting processes enables the continuous integration of optical, electronic, sensory or bionic micro- and nanostructures on large surfaces and flexible substrate materials. Roll-to-roll micro- and nanostructuring thus forms the basis for the development of novel and cost-effective products in optics, electronics, sensorics, diagnostics, packaging or security industries.

In the system designed and installed at the Institute, a film on a roll is used as a substrate. After unwinding, a coating step takes place in which the material to be structured is applied to the substrate. Typically, the materials are UV-curable varnish formulations from our NILCure™ series.

The coated film is then transported via rollers to the imprinting unit, where the structuring of the coating is carried out. In micro/nano imprinting, a flexible stamp with a surface profile of micro and/or nano structures is used as a tool. This flexible stamp is wrapped around the imprinting roller and held there magnetically.

During circulation of the imprinting roller, the structure of the stamp is transferred to the liquid coating, which is supported by the web tension, capillary forces and, if necessary, additional pressure by means of a counter-pressure roller. The varnish is cured with UV light as it circulates around the imprinting roller.



➡ Specification:

Resist coating by means of gravure printing or slot die deposition	Coating thickness window	200 nm – 200 µm
UV imprinting and hot embossing	UV LED irradiance	max. 14 W/cm ² , 365/395 nm
	Mercury vapour lamp	max. 18 W/cm ² , broadband
	Line pressure UV imprinting	max. 60 kN/m
	Line pressure hot embossing	max. 330 kN/m
	Temperature hot embossing	max. 200°C
Lamination	UV lamination	
Substrates	transparent films	width 250 mm
Throughput	track speed	0.5 – 30 m/min
Pre-treatment	Corona	max. 1000 W
In-line characterisation	Line scan camera	Resolution 5 µm

The research group for Hybrid Electronics and Patterning has been involved in the development of manufacturing processes for optical, optoelectronic and electronic components for more than 10 years. The established know-how in design, fabrication, characterisation and optimisation is now available to industry in combination with the roll-to-roll pilot line for the development of sustainable industry-compatible manufacturing processes.

