MORPHOTONICS
Nanoimprint technologies

Morphotonics

Panel-level NIL for advanced Packaging

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Company | Morphotonics

Solution | Nanoimprint Lithography (NIL) based on proprietary Roll-to-Plate (R2P) technology, started in 2014 building on 10 years of research

Team | Diverse team of 50+ employees with various backgrounds, steered by experienced MT and backed by Top-Tier Deep Tech investors

Ecosystem | World-class ecosystem of local and global partners in place to deliver growth plans,

BRAINPORT
EINDHOVEN

Design freedom in textures on larger areas

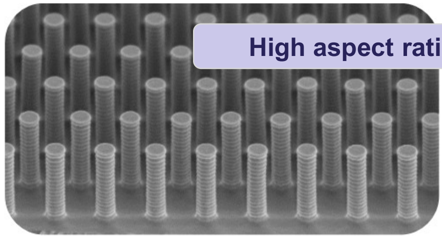
Nanoimprinting at Panel-level

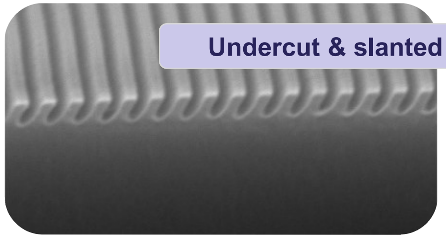
- **Substrate:**
  - Glass, Polymer, metals; Square or round
  - Size 620 x 650mm (1pcs or multiple-up)

- **Materials**
  - Rapid UV-Acrylates (for instance for etching)
  - Polyimides or planarization layers
  - MPH has unique proprietary stamp materials for >1000x re-use and high dimensional stability

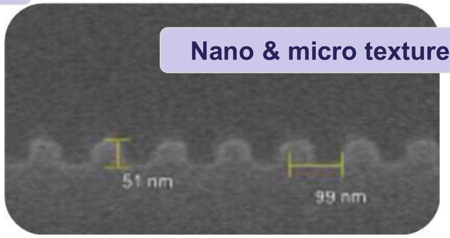
- **Different textures for different applications**
  - MLA's and lenticulars for displays (glasses-free 3D)
  - Slanted and blazed gratings for AR glasses
  - Micro-lanes for RDL or waveguides (CPO)

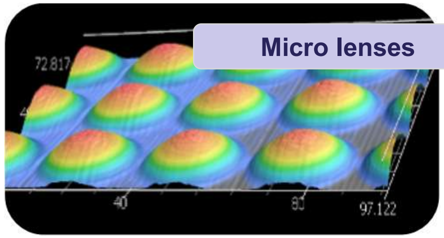
- **Etching in glass or metal layers**
  - High-end electronics or optics (waveguides) as example: realized functional TFT's

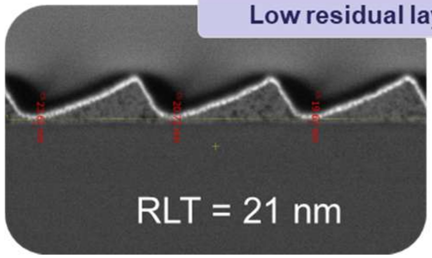

High aspect ratios


Undercut & slanted

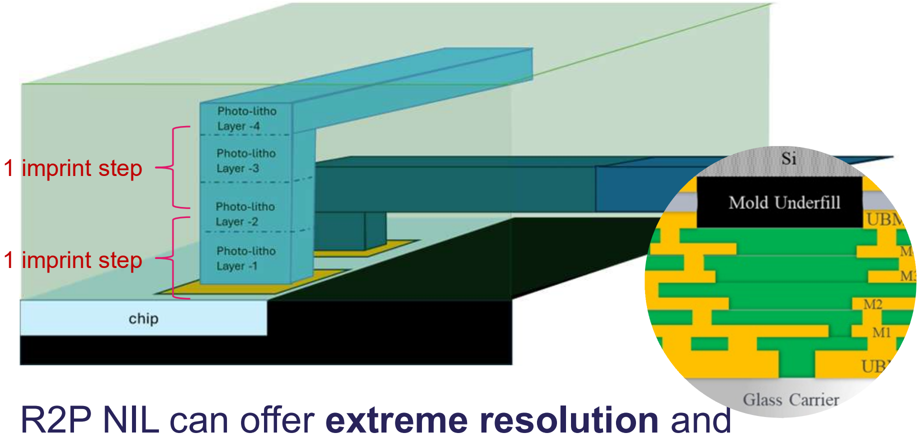

Nano & micro textures


Nano & micro textures


Micro lenses


Low residual layer

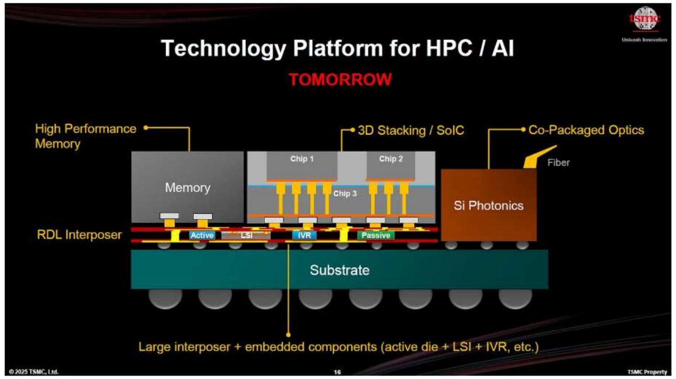
Panel-level NIL beneficial for back-end packaging



- R2P NIL can offer **extreme resolution** and **high freedom-of-design** (e.g. multilevel, shape, …) patterning of RDLs at high volume, **imprinting fine trace & via in 1 -step**

- **Production costs can be reduced** by replacing one or more PL and developing steps in the production process

- Compatible with **downstream CMP process** or in future potentially seed-layer printing + plating



Technology Platform for HPC / AI

TOMORROW

Large interposer + embedded components (active die + LSI + IVR, etc.)

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- R2P NIL can offer **curved waveguides for photonics integration** into advanced packaging

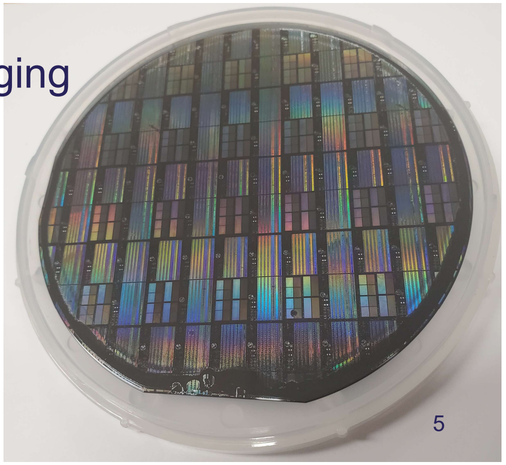
- Imprint + SiN etching is known process with likely **better performance over Litho**

- Single layer waveguide printing or in **combination with RDL process.** Large area mastering is available

Making it simpler, faster and greener

Summary | panel-level NIL in advanced packaging

- Using nanoimprinting (NIL) for advanced packaging makes process **simpler, faster and greener**
- Morphotonics provides **panel-level NIL solutions** (process, equipment and materials),
- Morphotonics NIL technology **proven in the 3D display, AR market and by panel-sized functional TFT.**
- Dedicated **panel-level imprint equipment with overlay accuracy** in development (+/-5 to +/-1 micron)
- Panel level NIL brings freedom in design making **RDL layers** and **integrated optical waveguides**
- Morphotonics is **looking for partners** to further develop NIL for advanced packaging



Imprint in polyimide PL-resin

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