

## Nanoimprint lithography

Nanoimprint lithography (NIL) enables high-resolution patterning with attractive cost of ownership for countless applications, such as the production of advanced displays and novel optical architectures with precise tuning of optical properties. Imec's complete portfolio allows you to integrate NIL in an automated, reliable foundry process.

### A full NIL portfolio under one roof

It takes more than one tool to achieve a successful NIL process. That's why imec offers support for all the steps of the workflow.

#### Mastering

We support the design and fabrication of your high-resolution high-density masters up to a 300mm area.

#### Materials evaluation

Thanks to our large network of suppliers and screening capabilities, we guide your choice of the stamp and resin materials best suited to your application.

#### Process development

We work out the full process flow of your device on our industry-grade 200mm and 300mm equipment from design, to substrate preparation, to imprint and etching.

#### Manufacturing

Once your device is ready, imec can take care of its low-to-medium-volume production – or effortlessly transfer the process to an industrial foundry for high-volume manufacturing.

#### Metrology

Underlying the accurate execution of all these steps is our broad metrology portfolio including FIB, CD-SEM, X-SEM, ADM, optical microscopy and profilometry.



Imec's advanced lithography 300mm cleanroom

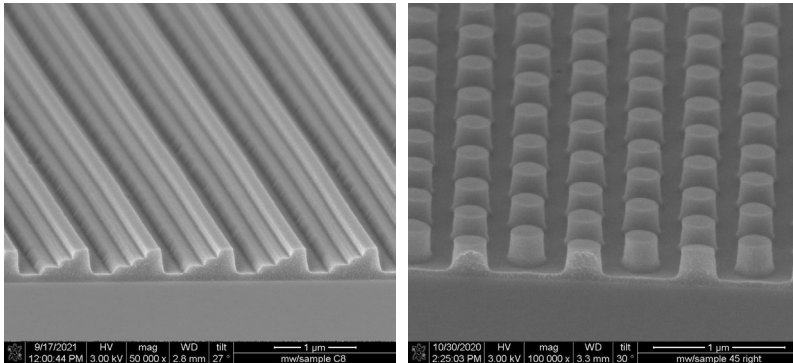


NIL HV equipment in imec's class 1 Fab

## Large-area, high-resolution master manufacturing

We use (immersion) DUV and e-beam lithography, in combination with our extensive etching expertise to develop masters for a range of application-specific structures such as optical gratings, flat optics and metasurfaces.

Item	Master specifications
Wafers	200mm and 300mm Si wafers + typically CVD-grown SiO <sub>2</sub>
(Immersion) DUV lithography	<ul style="list-style-type: none"> <li>Resolution down to 40nm</li> <li>Overlay &lt; 10nm (+/- 3 <math>\sigma</math>)</li> <li>Stitching accuracy: 6nm (same reticle)/10nm (different reticles)</li> </ul>
E-beam lithography	Resolution down to 25nm

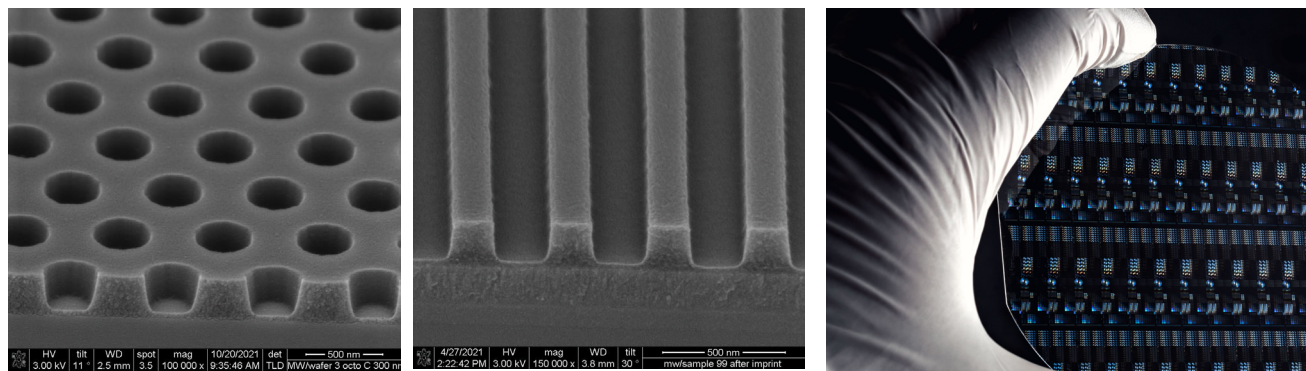


Optical grating

Metasurface

## Why use NIL?

1. Cost-effective choice for high volumes or high-resolution and hypercomplex layouts
2. Scalable towards large-area substrates and flexible in material selection
3. Reduction of process steps thanks to direct imprinting of functional layers



SEM of patterns imprinted from the stamp into a NIL resin. On the left: field of densely packed nanowells, diameter of 350nm, height of 150nm and resin residual layer at the bottom of the well of less than 20nm. On the right: field of periodic gratings, width of 200nm, pitch of 400nm, height of 150nm. Residual layer between the lines of less than 20nm.

Nano-imprinted wafer

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