

# Nanostructuring News

**Newsletter of EULITHA AG** - November 2017

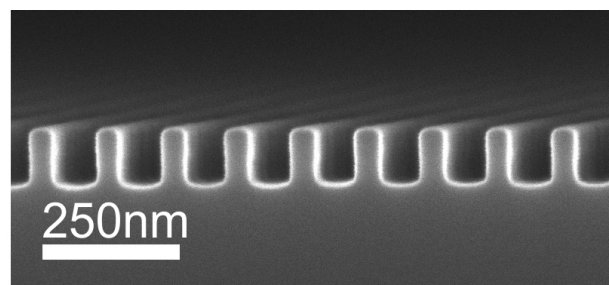
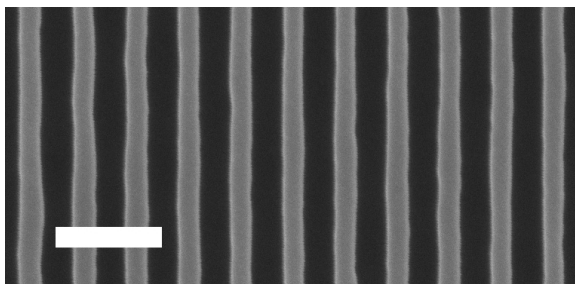
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## **Printing 62nm Line/Space Patterns Uniformly on a DUV PhableR 100 system**

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High-resolution periodic structures such as linear gratings with periods in the deep sub-wavelength range of 100-150nm are required in emerging photonic applications, such as wire-grid polarizers for visible light. Eulitha has recently demonstrated large-area printing of 125nm-period linear gratings on its PhableR 100 DUV photolithography system. Uniform gratings were easily printed over 100mm-diameter wafers with this technique. Many other applications stand to benefit from this practical way to print extremely high resolution structures, which include DFB lasers, anti-reflection structures, DUV and EUV gratings, nanowire growth templates, plasmonic structures, DSA templates, and data storage templates.

In addition to the extremely high-resolution, the other advantages of the PHABLE technology such as being non-contact, low-cost and scalable makes the technique attractive for use in academic as well as industrial solutions. The new development was presented at the [MNE conference](#) in Braga, Portugal.



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## **Waterford Institute of Technology Orders a PhableR 100 Photolithography System**

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The PhableR 100 nano-lithography system will be installed at the Pharmaceutical and Molecular Biotechnology Research Centre (PMBRC) of the Institute

EULITHA received an order for one of its unique PhableR 100 photolithography systems from [Waterford Institute of Technology](#) (WIT - Ireland). The system is going to be used primarily to develop new types of diagnostic sensors based on plasmonic response of metallic nano-patterns. When fully integrated within the PMBRC's new laboratories the PhableR 100 will underpin a new research facility that will comprise state of the art equipment in nanofabrication, printable materials deposition and materials characterisation. The exposure tool allows the precise replication of nanopatterns onto the sensor substrate that is required for the extreme multiplexed sensor systems to be further developed. It will also be used by researchers to exploit the optical resonance properties of plasmonic nanostructures to further develop applications in NIR spectroscopy for Process Analytical Technologies (PAT), healthcare and smart agriculture. Dr Joseph O'Mahony, project leader at PMBRC says "The PMBRC is enthusiastically looking forward to receiving the PhableR 100 tool and working with the Eulitha team to demonstrate the exceptional capabilities of Displacement Talbot Photolithography."

[Read more](#)

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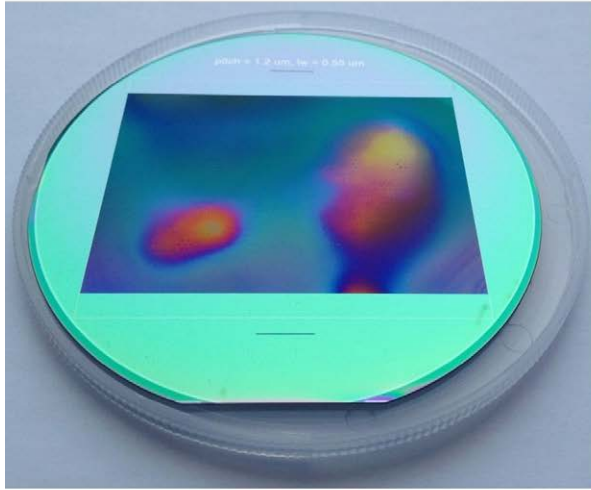
## **Gratings Fabricated on a PhableR 100 System Enable New Medical Imaging Technology**

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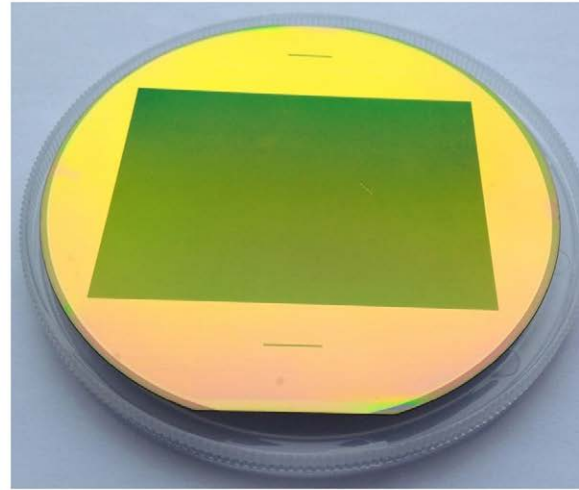
X-ray grating interferometry is a new technology that promises to revolutionize x-ray medical imaging. Conventional radiology, as it has been used since the discovery of x-rays, is sensitive to differences in absorption, such as the difference between bone and soft tissues. In contrast, the x-ray grating interferometry technique, pioneered by researchers at the Paul Scherrer Institute (PSI), is sensitive to differences in phase shifting properties of materials. This should enable doctors to visualize features, such as malignant formations, which have not been visible through other imaging methods before. However, fabrication of the necessary x-ray gratings remains a bottleneck in the development and widespread use of this technology.

One of the challenges is related to the patterning of large areas, small pitch, stitching free gratings in order to fulfill requirements of realistic systems for medical imaging. Researchers at PSI have been using exposures on a PhableR 100 system to develop such gratings. Their results, which show the achievement of uniform gratings with submicron linewidth and aspect ratios as high as 30 have been presented at the SPIE Advanced Lithography conference this year. The lead author, Dr. Jefimovs says PHABLE technology seems to be a fast, cheap and reliable method for patterning structures with dimensions from few micrometers down to few hundred nanometers on a wafer scale. [Read full article](#)

1.2 $\mu$ m period linear gratings printed with a conventional mask aligner and PhableR 100



Mask aligner (vacuum contact photolithography)  
Mask-wafer gap variations cause severe non-uniformity



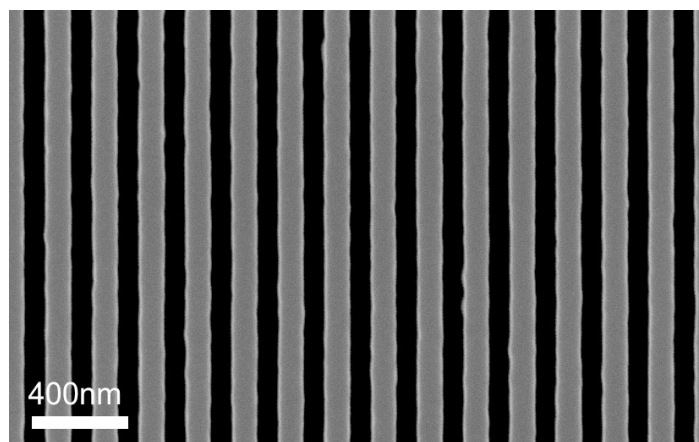
PhableR 100 (Displacement Talbot Lithography)  
Uniform exposure due to gap insensitivity

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## Testing a DUV Photoresist from micro resist technology GmbH on a PhableR 100 DUV System

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Successful application of any nano lithography technology depends on the availability of a high resolution exposure/printing system and high performance materials. In a collaboration that brings these two critical aspects together, Eulitha and micro resist technology GmbH of Germany tested the performance of one of the negative tone photoresist materials manufactured by MRT. The material (ma-N 2400) was exposed on a newly completed DUV PhableR 100 system to print 100nm half-pitch line/space gratings. The printed structures were also tested in a pattern transfer step where the lines were etched into silicon. The results demonstrated the good potential of ma-N 2400 as a negative DUV photoresist with a large exposure dose latitude. The dose required for printing lines was found to be similar to modern chemically amplified DUV photoresists commonly used in production of integrated circuits. For more information please contact [micro resist technology GmbH](#) or Eulitha.



100nm L/S pattern printed in ma-N 2400 on a PhableR 100 DUV system

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## New Eulitha Video

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Take a look at our new short video to learn more about Eulitha, its vision for the field of photonic patterning, its technology and the team behind it all.



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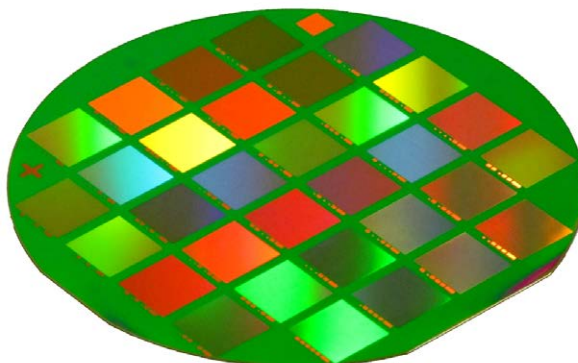
## New Products

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New large-area photonic structures are now available giving our customers more choice in the design of their experiments and devices. Here are some of the new additions:

### **MP500L2050**

Linear Gratings Galore! 32 gratings with different periods ranging from 500nm to 2050nm are present on a single 100mm wafer. This unique product will enable researchers to imprint or test many different gratings on one wafer.



## P125L\_80d

Sub 100nm resolution over large area. Linear grating pattern with 125nm period covering an area of 80mm diameter. This extremely high resolution mold enabled by our DUV PHABLE technology is ideally suited for fabrication of sub-wavelength devices such as wire-grid polarizers.



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## Meet us at

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### Photonics West - January 2018

The Moscone Center San Francisco, California, United States  
January 27 - February 1, 2018



### nano tech Tokyo - February 2018

Tokyo Big Sight, East Halls 4-6 & Conference Tower  
February 14-16, 2018



### Semicon China - March 2018

Shanghai New International Expo Centre  
March 14-16, 2018



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