

Nanostructuring News

Newsletter of EULITHA AG - November 2016

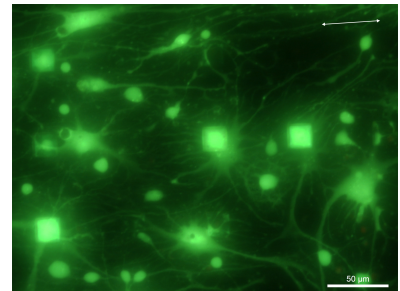
We are excited to present to you our new products, solutions and news in this newsletter. We look forward to hearing from you and working with you to find solutions to your lithography needs.

PhableR 100 Application: Neuronal Networks

University of Twente researchers use PhableR 100 system to create nano-scaffolds for di-rectional neuronal network formation

Neuronal networks grown on engineered surfaces provide model systems to investigate circuit-connectivity, neurophysiology and pathology of neurons. In such experiments it is important that the neuronal cells are maintained in a state that is as close to their in vivo state as possible. In a recent article published in the Journal of Vacuum Science and Technology researchers from the University of Twente have demonstrated patterning of surfaces with sub-micron scale linear gratings in order to guide cell outgrowth. Patterning was performed with the Displacement Talbot Lithography (DTL) technique on the PhableR 100 system which is installed at the MESA+NanoLab cleanroom of the university. Use of the DTL method enabled the researchers to produce uniform gratings on non-flat surfaces efficiently and reproducibly which led to the successful conclusion of the important experiments on neuronal network formation.

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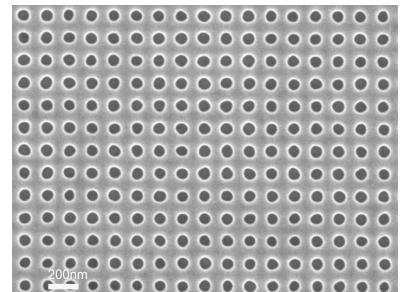


New Iridium-Nickel Nanoimprint Molds

EULITHA and collaborators introduce novel Iridium-Nickel composite nanoimprint molds

Ni molds are preferred in many nanoimprint applications due to their durability and their adaptability to different processing equipment such as rollers or injection molding systems. However, the fabrication of high-resolution nickel molds presents an enormous challenge, due to the difficulty of filling nanometer-scale features by the electroplating process which is typically used to fabricate such molds. Eulitha and its collaborators from A*STAR in Singapore, Paul Scherrer Institute and microSWISS AG in Switzerland, have introduced a new method to overcome this difficulty, which involves Atomic Layer Deposition (ALD) of an iridium layer on a master pattern to form precise nanostructures. A thick Ni substrate is then electroplated on the back of the Ir nano-structures to form an exceptionally precise, smooth and strong nanoimprint mold. The original pattern, an array of holes on a 150nm-period square lattice, used in this demonstration work was produced on a PhableR tool from Eulitha. The mold was tested in a series of imprint experiments which showed no evidence of mold degradation. This new method is expected to greatly facilitate fabrication of high resolution patterns with the nanoimprint process. Ir-Ni molds are now available from Eulitha.

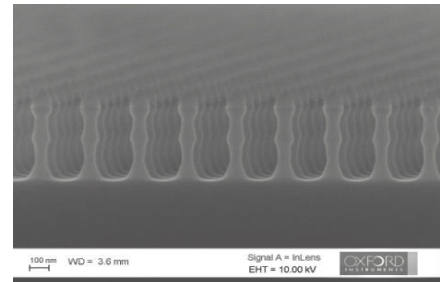
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PhableR 100 Application: Si Etching

Oxford Instruments and Twente University present 3D Nanomachining of silicon wires made with DTL technique

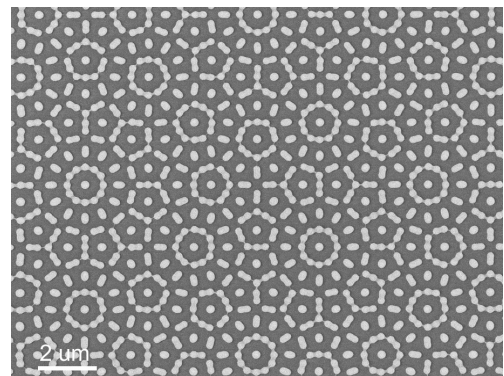
Precisely controlled dry etching of silicon to fabricate various complex shapes in the nanoscale is important for fabricating the necessary structures needed for many applications in electronics, MEMS, NEMS and photonics. Researchers from Oxford Instruments and Twente University used a PhableR 100 system to print arrays of 100nm dots in photoresist on Si wafers. A dry etch was developed based on SF₆-C₄F₈ chemistry on an Oxford Instruments PlasmaPro100 Estrelas system to etch Si nano pillars as high as 440nm and with 1% height uniformity. In addition, by controlling the etch chemistry it was possible to modulate the pillar diameter during the etch to obtain 3-dimensional shapes as seen in the adjacent figure. The process optimization required to achieve these result was enabled by the availability of uniformly patterned nanodot arrays obtained with the DTL technique. The work was presented at the Micro and Nano Engineering (MNE) conference in Vienna.



New Pattern Types with PhableR 100

High rotational symmetry quasi-periodic structures

Quasi-periodic structures with a high degree of rotational symmetry are desired as photonic materials due to their nearly isotropic optical response in contrast to highly directional behavior of periodic lattices. Eulitha has developed a new method at the based on superposition of periodic structures obtained with the Displacement Talbot Lithography to print such structures uniformly and reproducibly over large areas. High-quality patterns with 10 and 12-fold symmetry, having resolution in the sub-micron to micron range are demonstrated. The technique is suitable for wafer-scale fabrication of photonic patterns for applications that require quasi-crystal structures with nearly isotropic optical response. The new method was recently presented at the MNE conference in Vienna. Nanoimprint templates and other substrates pattern with such quasi-periodic structures are now available from Eulitha. Please inquire with us for details.



New Cleanrooms and Offices for Eulitha

Eulitha moves to new facilities

After successful introduction of its PhableR 100 lithography system, Eulitha AG decided to expand its R&D and production capacity. As part of that expansion, Eulitha has moved to a new location in the town of Kirchdorf, which is only about 5km away from its previous location. A new class 1000 cleanroom facility was built at the new location prior to the move which took place over the summer months. At the new facility Eulitha will operate its Phable lithography systems for production of nano-structured substrates. Assembly and testing of Phable photolithography systems as well as research and development activities will be carried out in the new cleanrooms as well. In addition to increasing its capacity the new facilities will help Eulitha better address its customers' patterning needs in terms of both quality and quantity.



New products

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:

p1000L_100d

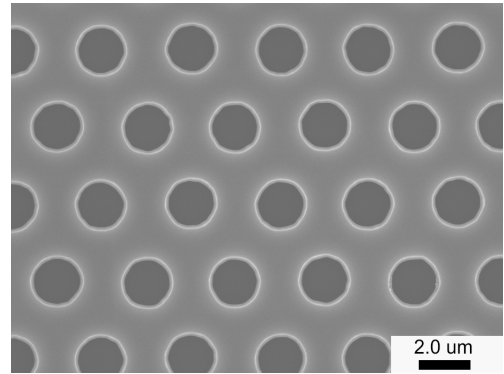
1000nm period linear grating, 100mm-circular area

p2000h_p_100d

2000 nm period hexagonal array, 100 mm-circular area

p3500h_p_100d

3500 nm period hexagonal array, 100 mm-circular area



Conferences & Events

MRS - December 2016

Materials Research Society Fall 2016 Meeting
November 27-December 2, 2016, Boston, USA



Photonics West - January 2017

The Moscone Center San Francisco, California, United States
January 28-February 2, 2017



Semicon China - March 2017

Shanghai New International Expo Centre
March 14-16, 2017



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