Nanofabrication with 3 different Beams and its Verification by automated SEM Imaging and Metrology

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With nano- and microfabrication systems now also comprising laser beams, Raith has recently added a new technology to its product portfolio. Laser beam lithography (LBL), also referred to as direct write photolithography or maskless photolithography, now ideally complements the existing Raith Electron Beam Lithography (EBL) and Focused Ion Beam (FIB) technologies. The *Picomaster* series for LBL ideally fits the equipment philosophy of Raith by offering flexible and high performance LBL systems for both R&D-focused and productive environments thus extending the possible application range from single-digit nanoscale resolution tasks up to fast large-area patterning. Customers may now choose from a wide instrumentation portfolio that has been designed for increasing efficiency in their labs by implementation of system connectivities.

The latter statement does not only refer to the nano- and microfabrication workflow itself, but rather includes qualification and verification of the lithography result and the subsequent process technology step. Not only for critical point inspection, but specifically in order to secure the lithography process repeatability and helping to bridge the "death valley from lab to fab", it is increasingly essential to dispose of capabilities for fully automated large area SEM imaging and metrology – something that is provided with Raith CHIPSCANNER.

In this talk, recent highlights spanning the entire Raith product portfolio will be presented. VOYAGER, representing a new class of ergonomic dedicated EBL systems, now provides simplified access to dedicated EBL with push-button performance – even for EBL novices. Moreover, VOYAGER offers specific advanced solutions for the fabrication of highest quality photonic devices like metalenses and waveguides.
Featuring a new Liquid Metal Alloy Ion Source incorporating Gallium, Bismuth and Lithium [1], the top-down FIB nanofabrication system VELION enhances to a powerful ion microscope for 3D tomography and sample reconstruction. Heavy Bismuth milling is used for accurate sample delayering at highest depth resolution, whereas light Lithium ions from the same source are applied to take high lateral 2D images with lowest surface degradation.

[1] W. Pilz, N. Klingner, L. Bischoff, P. Mazarov, and S. Bauerdick, Lithium ion beams from liquid metal alloy ion sources, JVSTB 37, 021802 (2019).