

## Capability

### *Velion Ion Beam Lithography system*



Raith Velion system is a combined Focused Ion Beam (FIB) and Scanning Electron Microscope (SEM) that operates a variety of isotopically controlled ion sources for imaging, milling and deposition.

### Applications

Optical metasurfaces and metasurface platforms, photonic crystals, optoelectronic and optical systems, plasmonic systems, nano-imprint lithography, field-effect transistors, and other features inaccessible to optical lithography.

### Specifications

-Dedicated nano-FIB three-ion 35 kV column for direct, Ga-free, and three beam (either of the following: Si, Ge, Au) nanofabrication

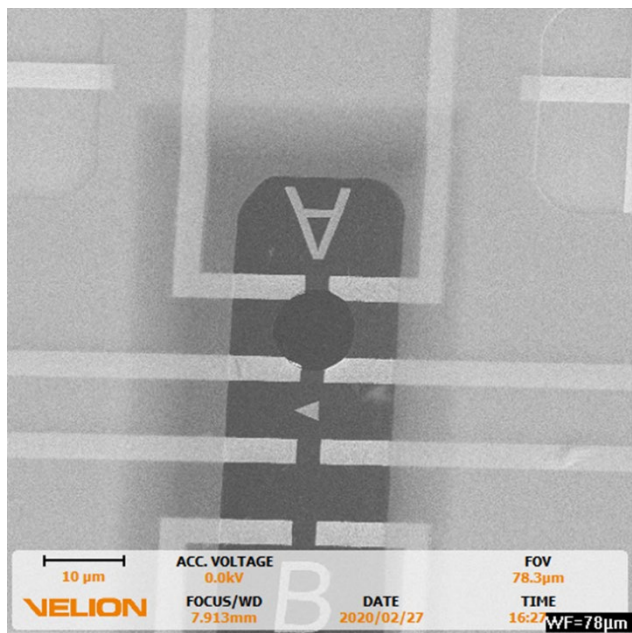
Beam size for Si<sup>++</sup> at 35 keV

5.7 nm

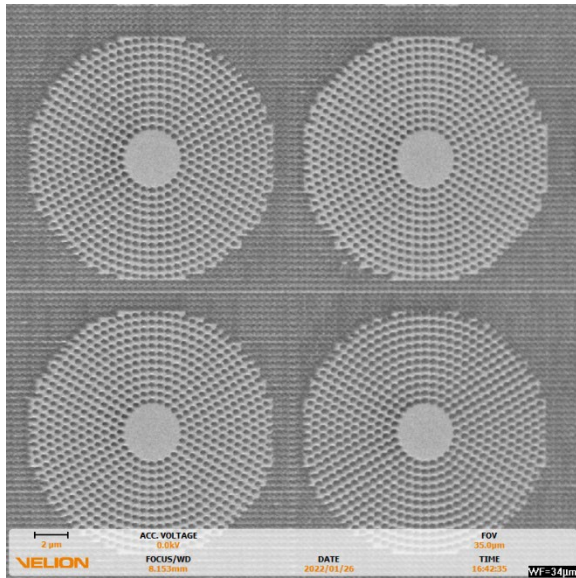
Beam size for Au++ at 35 keV	10.6 nm
Beam size for Au+ at 35 keV	13.2 nm
Beam size SEM at 10kV	3.6 nm
Minimum patterned in 30 nm Au film feature size:	
with Si++ at 35keV	16.7 nm
with Au++ at 35keV	18.6 nm

- Tailored high-resolution FE-SEM inspection 30 kV column
- Laser interferometer stage, 4" full travel.
- Multi-species ion beam technology
- Matured software for nanofabrication and inspection
- Truly continuous writing strategies
- Gas injection, nano manipulators, rotation and tilt sample holder for inspection.

Some examples:



Micropore in SiN membrane for a fluidic device.



Plasmonic device structures in gold film

#### Recent publications

-Ningxin Li, Aisha Okmi, Tara Jabegu, Hongkui Zheng, Udagamage Kushan Wijewardena, Diren Maraba, Ivan Kravchenko, Kai Xiao, Kai He, Sidong Lei van der Waals semiconductor empowered vertical color sensor: towards miniaturized camera//ACS Nano.-2022.-16 (6).- p.8619–8629.

-Troy C. Messina, Bernadeta R. Srijanto, Charles Patrick Collier , Ivan I. Kravchenko, andChristopher I. Richards Gold Ions Beam Milled Zero-Mode Waveguides//Nanomaterials.-2022.-12(10).-1755

#### Contact

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