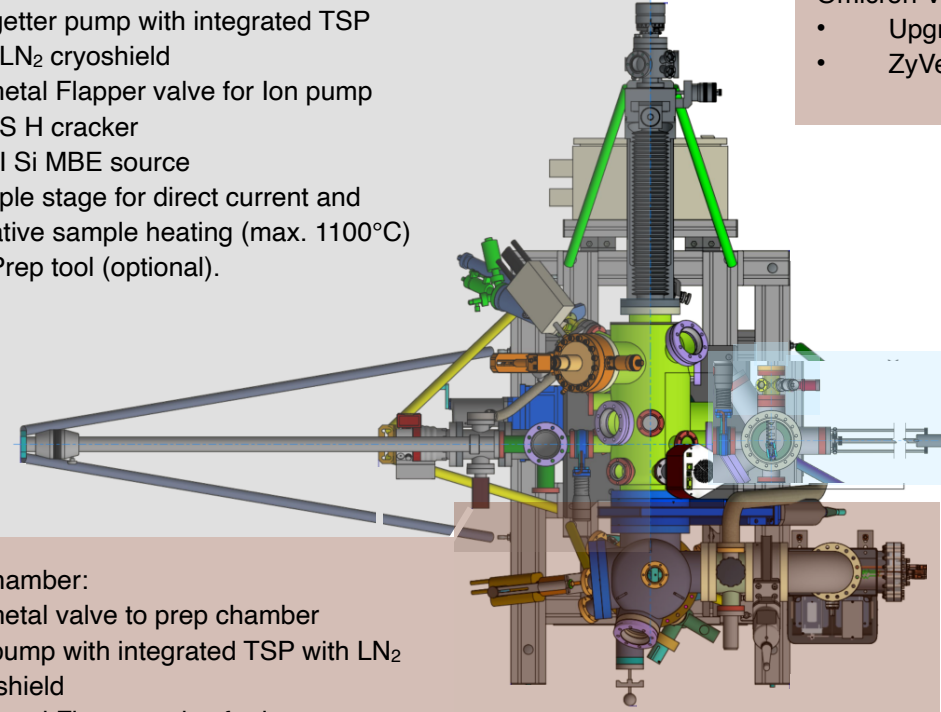## UHV system for STM Lithography

ZL-1 Standard

Prep chamber with loadlock:
- Ion getter pump with integrated TSP with LN_2 cryoshield
- All-metal Flapper valve for Ion pump
- HABS H cracker
- SUSI Si MBE source
- Sample stage for direct current and radiative sample heating (max. 1100°C)
- Tip Prep tool (optional).

Omicron VT STM:
- Upgrade to LT STM for better patterning.
- ZyVector STM control system

Option: gas dosing chambers for gases such as phosphine:
- Flapper valve to prep chamber
- Small ion pump
- Bypass to turbo of chamber #3

VT STM chamber:
- All-metal valve to prep chamber
- Ion pump with integrated TSP with LN_2 cryoshield
- All-metal Flapper valve for ion pump
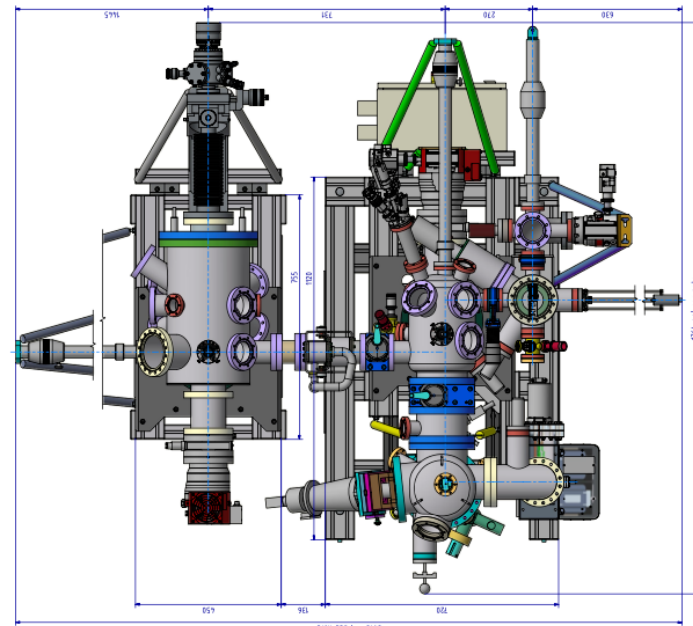- Port for PH_3 gas dosing
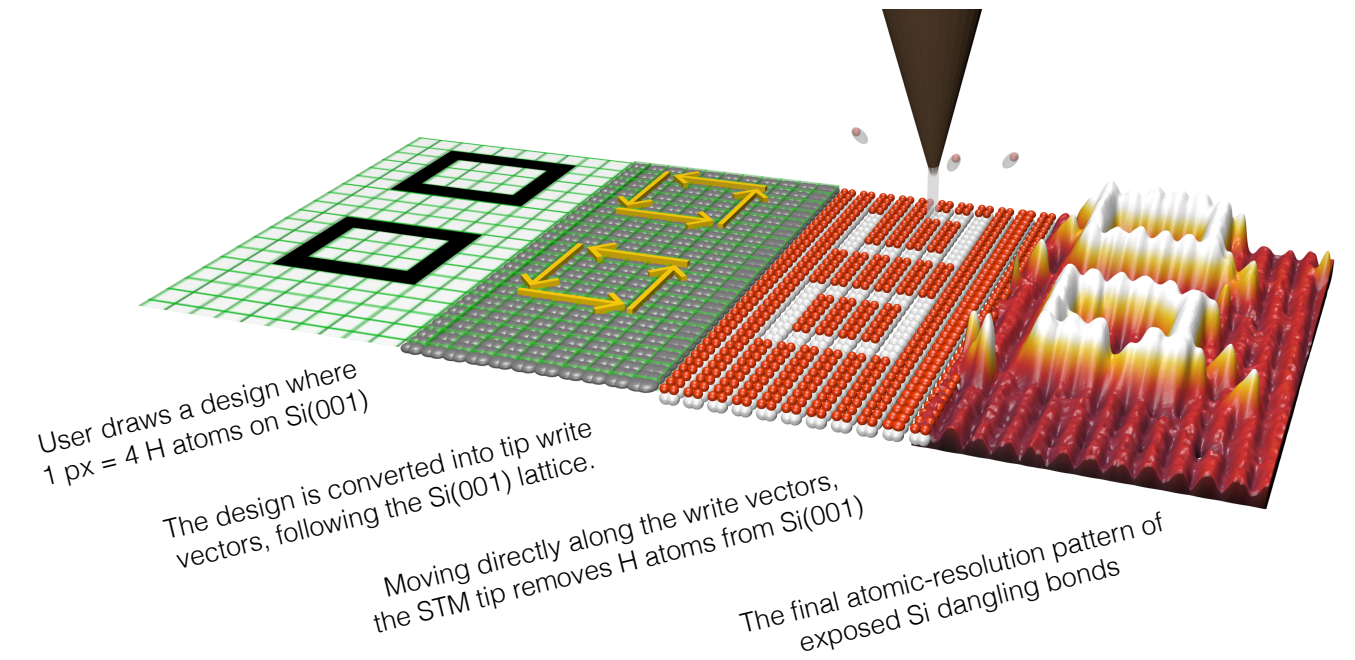
ZL-1 Advanced

Prep chamber with loadlock:
- Ion getter pump with integrated TSP with LN_2 cryoshield
- All-metal Flapper valve for Ion pump
- HABS H cracker
- Sample stage for direct current and radiative sample heating (max. 1100°C)
- Tip Prep tool (optional).

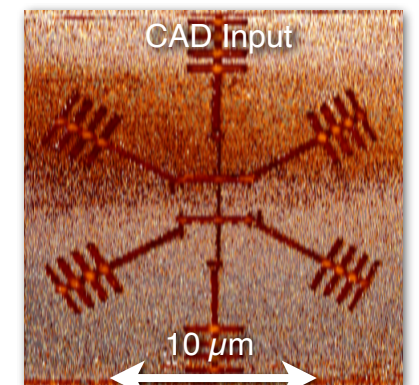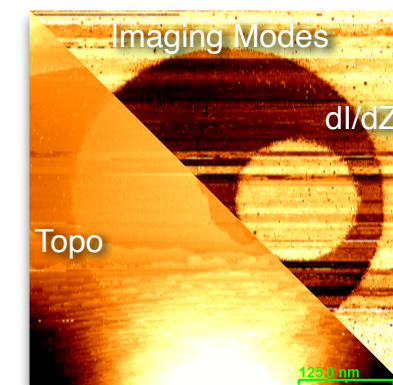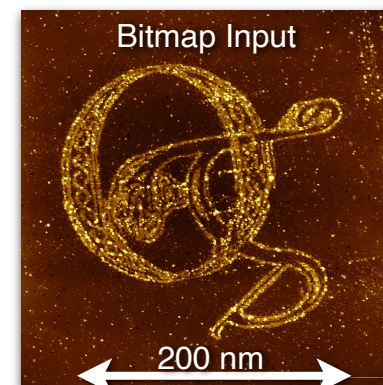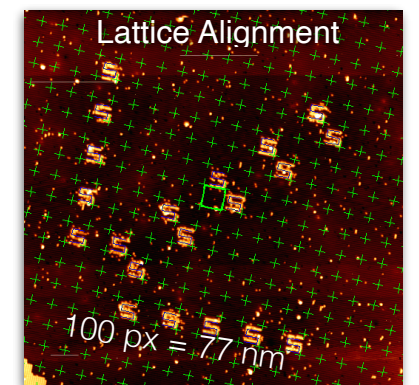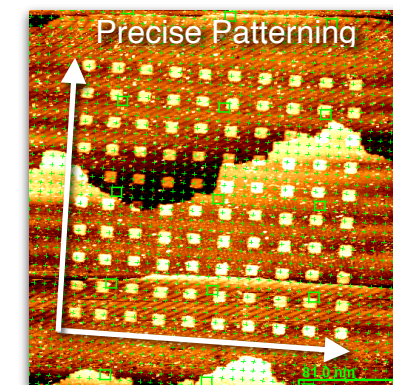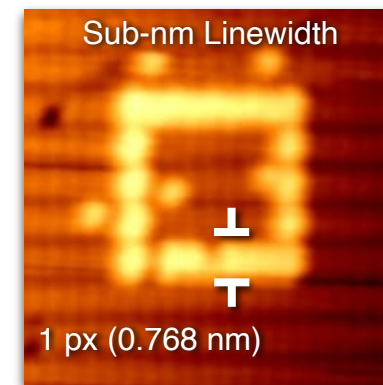Separate Si Deposition Chamber for better quality epitaxy:
- Ion getter pump with integrated TSP with LN_2 cryoshield
- All-metal Flapper valve for Ion pump
- SI MBE source
- Sample stage for direct current and radiative sample heating (max. 1100°C)

Digital Vector Lithography with ZyVector™

User draws a design where 1 px = 4 H atoms on Si(001)

The design is converted into tip write vectors, following the Si(001) lattice.

Moving directly along the write vectors, the STM tip removes H atoms from Si(001)

The final atomic-resolution pattern of exposed Si dangling bonds

Automation and Scripting for Atomically-Precise Patterning

Sub-nm Linewidth
1 px (0.768 nm)

Precise Patterning

Lattice Alignment
100 px = 77 nm

Bitmap Input
200 nm

Imaging Modes
dI/dZ
Topo

CAD Input
10 μm

Technical Specifications:

ZyVector Lithography Controller

20-bit DSP

Provides real-time control of the tunneling feedback loop and bias voltage. and precise tip motion across the surface.

Piezo Driver

Pre-amp bias range control for Omicron preamp amplified current input
Fits Omicron VT STM preamp and PIC cabling.

Scanning

Omicron VT STM: 9500 nm.
Minimum scan bit size: 10 pm.
z range 1.3 μm.
Minimum bit size: 1 pm.

System Capabilities

Heater station for Sample Preparation

Si MBE source

Precursor gas dosing chambers

Advanced Position Controls

Local piezo tube calibration based on lattice recognition, including determination of lattice angle relative to piezo tube axes.
Lattice phase recognition for precise lithography positioning. Creep and Hysteresis position correction (CHC) in xyz.

Initial optimization of creep and hysteresis over scan range during installation.
(Fine optimization by user required periodically.)

Hydrogen Depassivation Lithography (HDL)

Two spot size modes available:

AP mode (single-dimer-row line width)

FE mode (wide line width, rough edges)

Advanced Scripting Capabilities

We provide scripts based on Python for test HDL patterns, creep correction calibration, lithography parameter calibration, etc.

User-written scripts can be easily incorporated and run using command line interface or drop-down menu.

For more information:
www.zyvexlabs.com
info@zyvexlabs.com
+1 (972) 235-7881

Zyvex Litho 1

Sub-nm Resolution Lithography System
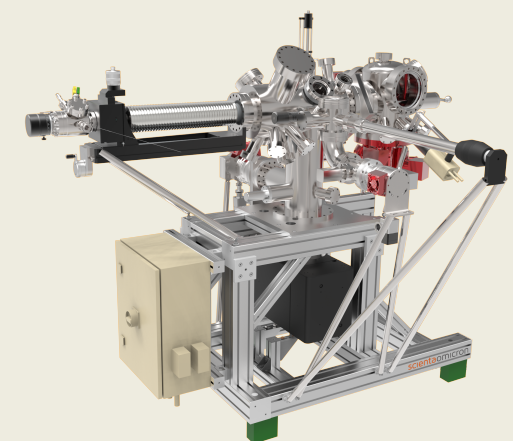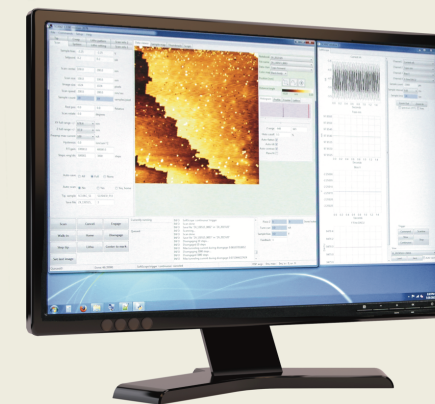
Making Atomic Precision Lithography a Reality

UHV system for STM Lithography

Precursor Gas Dosing and Si MBE

Digital Vector Lithography

Automation and Scripting

Distributed by:

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