Extended-Range Scanner for LT STM

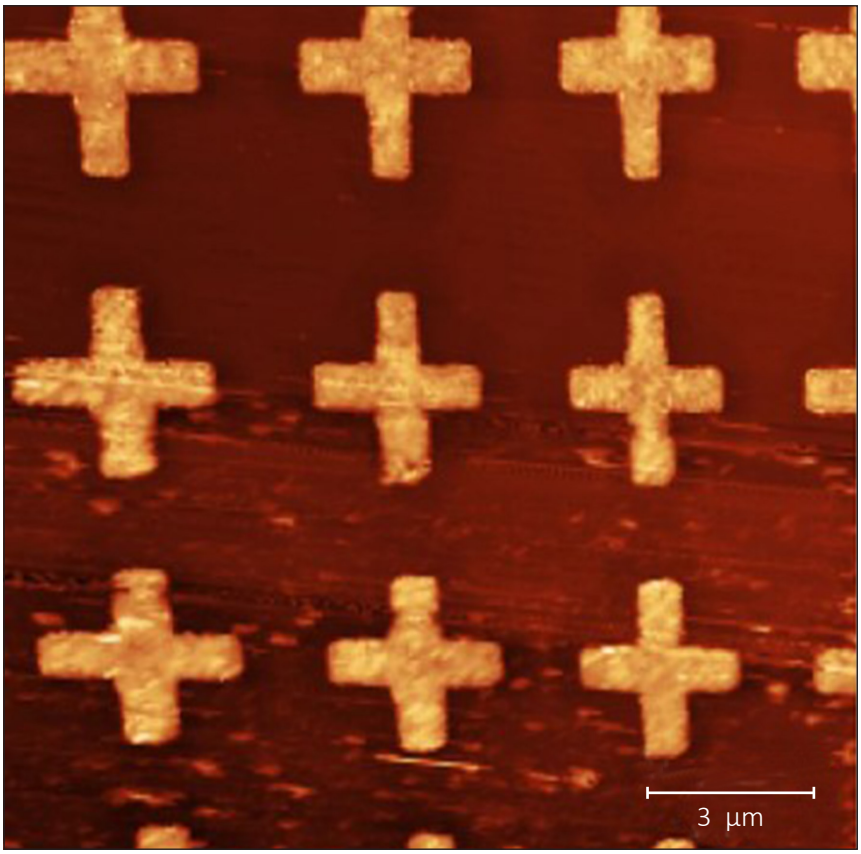
Zoom-out from your patterned samples

Overcome scan size limitations in UHV SPM by replacing your LT STM scanner with the new extended-range scanner, now available for upgrading[1] or new SPM's.

UHV SPM involving large-scale surface structures is typically limited by the finite range of the widely used XYZ piezo tube scan elements. While experiments profit from their simplicity, high spatial resolution, low noise, and resistance to bakeout procedures the typically implemented scanners for UHV SPMs significantly limit the maximum achievable scan volume. Their length cannot be infinitely extended due to loss of stability and space constrains in UHV SPM.

This intrinsically puts limits on experiments in which large scale patterns should be analysed. While stitching of multiple images might be possible for some type of experiments, it has an inherent loss of contact to the surface. This might easily imply a change in the microscopic tip shape or a loss of position due to undefined side-stepping distances. Due to the intrinsic loss of piezo conversion, low temperature experiments are affected in particular.

To overcome these limitations, Scienta Omicron has developed a new type of scanner unique to the UHV SPM world. While maintaining stability and space requirements in a UHV low temperature SPM environment the new scanner design adds up to a factor of four to the original scan range of our renowned Scienta Omicron LT STM with already best in-class scan range. Applications range from simple overview scans of large scale structures, large-scale lithography of e.g. Qubit structures, large-range statistics of defects, large-area surface maps for growth analysis etc.



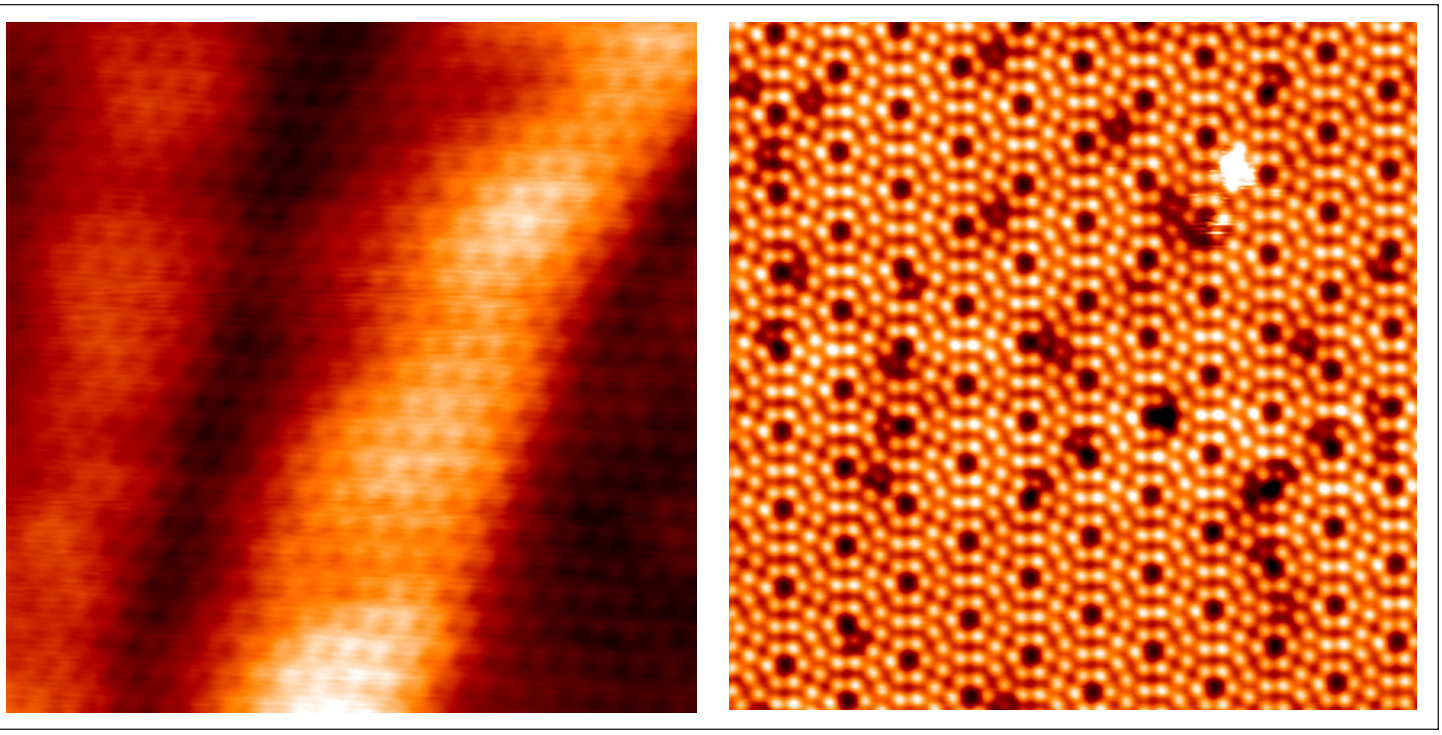
Very large-scale image (~18x18µm^2) taken at 77 K of metal features deposited on a silicon surface, demonstrating the extended scan range of the LT-STM scanner at low temperatures. The distance between cross centres is 5 µm.

Data courtesy of Michelle Simmons and her fabrication team at Silicon Quantum Computing Pty Ltd in Sydney, Australia.

Key Upgrade benefits

- **Larger Scan Area:** Multiple-fold increase in range for survey and nonintermittent lithography
- **High Stability:** Ensures precision at low temperatures without compromises
- **Easy Integration:** Compatible with most current LT STM versions
- **Advanced Research:** Ideal for large-scale mapping and defect analysis
- **Optimized for Low Temperatures:** Minimizes piezo conversion loss at low temperatures

[1] Upgrade available for most current versions of the LT STM, please contact us for more information.



STM images recorded with new large range scanner at T = 5 K: Left: Au(111) surface with herringbone reconstruction (atomic corrugation 1pm) Right: Si(111) 7x7 reconstructed surface.

Technical Highlights

Extended Range Scanner for LT STM	
Scan ranges X,Y,Z:	T = 77 K: > 10x10x0.5 μm^3
	T = 5 K: > 4x4x0.3 μm^3

The scanner can be upgraded for numerous LT STM installations. Contact us to request a quote for the extended-range scanner upgrade

Get in touch with us at **scientaomicron.com/ContactUs**