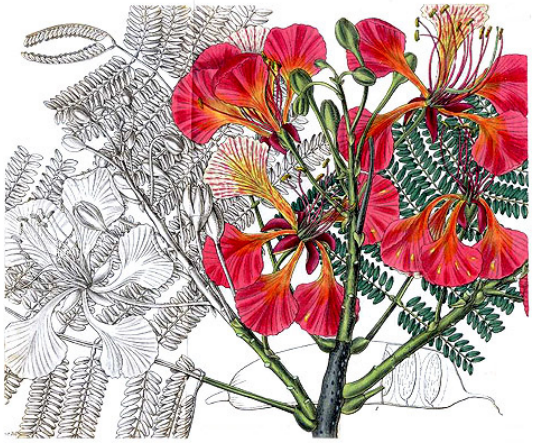
SiM : STM iMproved

*nano*REV™ Specification Sheet
Version 7.x



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Cover Image: Royal Poinciana (Delonix Regia), popularly known here as the Gulmohar tree is a flamboyant flaming tree blooming in the summers, a sheer delight to the eyes in an otherwise scorching city heat. It is such a wonderful tree, but its numbers are dwindling in the Capital, we would love to see them flourishing always!

S1 Electronics

	Features	Description
1	Main Power Supply input	220-240V AC/50 Hz, 15 W.
2	Power Supply outputs	+5V DC, ±15V DC, ± 110V DC, 110V AC.
3	Computer Interface	USB 2.0 Port.
4	Measurement Channels	4-channels, 16-bit simultaneous sampling ADC.
5	Scan generator	4-channels, 16-bit D/A converter.
6	Scan speed	51ms/line (max) for 256 data-points in each line (Dual imaging mode).
7	Scan drive signals	±100V DC.
8	Slope compensation	Digital horizontal and vertical slope compensation.
9	Tunnel Current Set Point Adj.	±10nA in steps of 5pA.
10	Servo Control	Digital Feedback Parameter (Gain, Time Constant) Adjustments.
11	Walker Display	LCD Display of piezo-electric walker's direction and no. of steps.
12	Bias Settings	-10V to +10V in Steps of 0.3mV,
		-100V to +100V in Steps of 3mV.
13	Imaging modes	Topographic imaging with sub-atomic resolution in:
		- Constant Current (CC) Mode,
		- Constant Height (CH) Mode.
14	**Imaging modes with LIA (Lock-in Amplifier)**	Simultaneous imaging besides topography:
		- Local Density Of States (LDOS) imaging,
		- Local Barrier Height (LBH) imaging.
15	I-V Spectroscopy	0.3mV bias resolution for 750 data points, with multi-point mode.
16	I-V Spectroscopy Modes	*I/V, dI/dV (numerical)* & Normalized *dI/dV* plots, Export to ASCII option available.
17	**Spectroscopy with LIA**	Simultaneous *I/V* and *dI/dV* acquisition from STM and LIA output channels, for multiple sample locations.
18	I-Z Spectroscopy	Tunneling Current vs tip-sample distance plots, Conductance vs Distance plots (Normal and Semilog) with data export options.
19	I-t Spectroscopy	Tunneling Current or feedback signal output vs time plots, for different feeback control settings. Data logging and export options available.

S2 Scanner

	Sizes	Max. Area	Min. Area	X/Y Resolution
1	**XL Area**	$3.4\mu m \times 3.4\mu m$	$13.6nm \times 13.6nm$	$0.053nm$
2	**Small Area**	$348nm \times 348nm$	$0.13nm \times 0.13nm$	$5.3pm$
3	Z-resolution	Analog Mode : $\leq 10pm$		
		Digital : $17pm$ (Using 16-bit DAC)		
4	Scan orientation	Horizontal and Vertical		
5	Max Z Range	± 400 to $\pm 550nm$ (Full-Stretch and Full-Retract)		
6	Sample approach	Piezo-tube Walker, 10× magnified and illuminated tip-sample junction view.		
7	Sample size	Sample disc dia. 10mm.		

S3 Vibration Isolation Platform : Table-top

1	Cut-off frequency	<10 Hz. Vibration suppression ensures atomic resolution imaging with the Scanner.
2	Isolation method	Passive.
3	Dimensions	22cm(L)×20cm(B)×16cm(H) : Small footprint, compact and lightweight.
4	Weight	∼7 kg.
5	Handling	Ergonomic handles for easy portability.
6	Platform	Guide-holes & mating arrangement for scanner (limit-less mating cycles).

S4 LIA (Lock-in Amplifier) Integration

1	Multi-channel Imaging	Simultaneous acquisition and display of LIA outputs as images or plots.
2	User Interface	Seamless control of all LIA parameters from STM software:
		- Frequency, amplitude and phase of the reference signal.
		- Gain-settings of different amplifiers, coupling modes, low pass filter cut-offs.
3	I/O Signals Interfacing	Front panel accessibility of modulation input and LIA output signals on STM .
4	Digital Phase Control	Auto phase-offset (due to interfacing) compensation feature.
5	Data Integration	For multi-channel modes, all the related LIA parameters stored along with STM images and plots data.

S5 LIA Specifications (Basic)

1	Reference Generator	10Hz to 1MHz
2	Full Digital Control	Software control of all parameters of the reference generator, amplifier gains and filter cut-offs.
3	Software Interafce	Python and C++ SDK library for LIA control.
4	Main Power Supply input	220-240V AC/50 Hz
5	Computer Interface	USB 2.0 Port.

S6 Accoustic (Air) Shield

1	Dimensions	Transparent Cover : 28cm(L)×36cm(B)×26cm(H).
2	Base	Small footprint ∼ 33cm×39cm.
3	Camera Optics	HD 720p camera for visual assistance during tip approach.

S7 Software: SiM

	Features	Description
1	Image Display	Dual Imaging Window for Scan and Retrace Image Display (Image size: 256×256 to 750×750 pixels)
2	CRO	In-built software CRO plotting imaging signal during scans
3	Movie Mode	Repetitive scan of same area upto ten frames, Movie files can be later split into individual images.
4	Sample Navigator	Graphical assistant for localized zooming w.r.t. a large area scan
5	3D	Colored 3D renderings, selection of color look-up tables
6	Data Export	Export to standard image file formats like jpg, png, ASCII, postscript format. Splits simultaneous channel data into individual image files.
7	Analysis Functions	Line (Single line profile) Extraction, localized Zooming, Roughness Display, Measure length and angles on the images, 2D-Fast Fourier Transformation.
8	Calibration	X/Y/Z-Calibration Utility.
9	Image Processing Tool	Slope and Z-drift Correction, Spatial and Fourier Low-Pass Filtering, Background Subtraction, Histogram Equalization, Zooming, Contrast, Contrast, Invert, Spike-noise Filter etc.
10	Image Viewing	Independent *nano*REV™ images (`*.npic`) viewing and processing software (optional)
11	Tip Locator Window	Displays current position of the tip over the sample.
12	Nano-Lithography	In-situ tip cleaning & restructuring utility by applying voltage pulses to the sample
13	Color Mode Selection	Customizable color modes for the image (both in 2D and 3D)
14	Multi-user CD	Runs from *Ubuntu Linux* distribution, Installer DVD included with separate CD with *nano*REV™ packages.

S8 Tool Kit

1	Pre-mounted Samples	HOPG(1) and Optical Drive(1).
2	Tools	Tweezer sets (2), Sample keys (2), Silver ink (1), Tip wire cutter (1).
3	Spares	Blank sample disc (8 pcs).

S9 Tip Kit

1	Platinum-Iridium tips	10 no.s with 0.25mm diameter, 8mm length.
2	Tungsten wire	0.25 mm diameter, 1m length.

S10 Manual

1	User Manual	Hard-copy (English) : 1 copy

S11 Sample Kit (Optional)

1	Pre-mounted Samples	$\leq$ 10 no.s of HOPG (Highly Oriented Pyrolytic Graphite), Bismuth Teluride (Bi_2Te_3), Indium Tin Oxide (ITO) and Optical Drives.
2	Sample Key	1

S12 Computer (Optional)

1	System Configuration	RAM $\geq$2GB, Min. Resolution 1024 $\times$ 768, DVD Drive.
2	Computer Interface	With at least 3 spare USB 2.0 ports.
3	OS	Linux.