

## Annexure-1

## Technical Specification for RF &amp; DC Magnetron Sputtering Unit

S. No	Description	Specifications
1.	<b>RF Power Supply</b>	<ul style="list-style-type: none"> <li>• 600 Watt or above @ 13.56MHz</li> <li>• Automatic Matching Network</li> <li>• 0.1Watt Resolution or better</li> </ul>
2.	<b>Power Supplies</b>	<ul style="list-style-type: none"> <li>• <b>DC Power Supply: 1 no</b> <ul style="list-style-type: none"> <li>- Power Rating: 1000 Watt</li> <li>- Output Voltage: -50 to -1000V DC</li> <li>- Current: 0 to 1A</li> </ul> </li> <li>• <b>DC Power Supply: 1 no</b> <ul style="list-style-type: none"> <li>- Power Rating: 2000 Watt</li> <li>- Output Voltage: -50 to -2000V DC</li> <li>- Current: 0 to 1A</li> </ul> </li> <li>• <b>Bias Power Supply</b> <ul style="list-style-type: none"> <li>- Power Rating: 500 Watt</li> <li>- Output Voltage: -50 to -500VDC</li> <li>- Current: 0 to 1A</li> </ul> </li> </ul>
3.	<b>Vacuum Chamber</b>	<ul style="list-style-type: none"> <li>• SS 304 or better chamber having dimension minimum of 350mm (W) x 350 mm(D) x 450mm(H) approx.</li> <li>• A front door opening</li> <li>• Toughened glass view port</li> <li>• Chamber should have provision for ports to connect Turbo pump, rotary pump, evacuation, gas feedings and vacuum gauges.</li> <li>• Top ports are required to mount Sputter gun to deposit from top to bottom (sputter down) in sequential and should be in confocal manner.</li> </ul>
4.	<b>Chamber Gadetry</b>	<p><b>Sputtering Cathodes: 3 nos</b></p> <ul style="list-style-type: none"> <li>• 3 number of indirectly water-cooled flex mount magnetrons with confocal arrangement, suitable for 2” diameter targets should be provided.</li> <li>• Magnetrons should have capability of accommodating 1-6mm thickness targets.</li> <li>• Manual height adjustment facility to vary the distance between target &amp; substrate and to manually tilting facility for focusing plasma.</li> <li>• Vacuum: Ultra High Vacuum (UHV)</li> <li>• Back out Temperature: Standard 180°C</li> <li>• Magnets: Standard Nd FeB</li> <li>• Manually operated source shutters with rotary shaft seal should be incorporated in the chamber.</li> </ul>

		<p><b>Substrate Heater</b></p> <ul style="list-style-type: none"> <li>From RT to a temperature of 600°C with PID controller with digital display.</li> </ul> <p><b>Substrate Rotation assembly</b></p> <ul style="list-style-type: none"> <li>Rotatable substrate holder capable of holding substrate from 5 mm dia. to 75 mm dia. and speed of 20 rpm.</li> </ul> <p><b>Bias Electrode</b></p> <ul style="list-style-type: none"> <li>High voltage feed through with Teflon insulated rated for 500W</li> </ul>
5.	<b>Mass Flow controllers</b>	<p><b>Gases: Argon -1 no, Oxygen -1 no, Nitrogen -1 no</b></p> <ul style="list-style-type: none"> <li>Range: 0-100Scm</li> <li>Accuracy: 1.5% of full scale</li> <li>optimum inlet pressure: 1.4 bar</li> <li>optimum differential pressure: 3.4 bar</li> </ul>
6.	<b>Vacuum Pumping System</b>	<p><b>a. Two Stage Rotary Vane Vacuum Pump: 1 no</b></p> <ul style="list-style-type: none"> <li>Direct Drive Rotary Pump</li> <li>Capacity (LPM) : 250</li> <li>Meter Cube per hour : 15</li> <li>Ultimate vacuum (mbar) : <math>&gt;1 \times 10^{-3}</math></li> <li>opened (mbar) : <math>&gt;5 \times 10^{-2}</math></li> </ul> <p><b>b. Turbo Molecular Pump: 1 no</b></p> <ul style="list-style-type: none"> <li>Pumping speed (for N<sub>2</sub>): 400 l/s.</li> <li>Compression ratio for N<sub>2</sub>: <math>&gt; 10^9</math></li> <li>Rotational speed: 52000 +/- 2%</li> <li>Ultimate pressure: <math>&lt; 5 \times 10^{-8}</math> mbar</li> </ul> <p><b>c. HIGH VACUUM VALVE</b></p> <ul style="list-style-type: none"> <li>Manually operated valve</li> </ul> <p><b>d. Valves</b></p> <ul style="list-style-type: none"> <li>Throttle valve - manually operated</li> <li>Backing and roughing valves - electro pneumatic</li> </ul> <p><b>e. COLLAR: 2 nos</b></p> <ul style="list-style-type: none"> <li>A 4" collar is made out of SS304 material, finely ground and electro-chemically polished. Ports are provided for connecting the vacuum gauges, which</li> </ul>

		<p>will be connected in between High Vacuum Valve and the Chamber</p> <ul style="list-style-type: none"> <li>• A 4" collar is made out of SS304 material, finely ground and electro-chemically polished. Having DN 160 ISO K at one end and on the other side Which will be connected in between Turbo pump and Gate Valve</li> </ul> <p><b>f. PLUMBING LINES</b></p> <ul style="list-style-type: none"> <li>• Plumbing lines of 1" NB to incorporate 02 Nos for both backing and roughing operation.</li> </ul> <p><b>g. Vacuum Measuring Gauges.</b></p> <ul style="list-style-type: none"> <li>• <b>Digital Pirani Penning Gauge</b> covering the range of 0.5 mbar to <math>10^{-6}</math> mbar. Specification of Digital Pirani Gauge: <ul style="list-style-type: none"> <li>- Measuring range: <math>1 \times 10^{-3}</math> mbar to 999 mbar. (N<sub>2</sub> equivalent)</li> <li>- Operating range: 15 - 50 °C</li> <li>- Electrical power (VAC) : 230 VAC</li> <li>- Power: 10 W Nominal</li> <li>- Frequency: 50 Hz.</li> <li>- Coupling: 10 KF coupling.</li> </ul> </li> <li>• <b>Digital Penning Gauge</b> to measure high vacuum in the range of <math>1 \times 10^{-3}</math> mb to <math>1 \times 10^{-6}</math> mbar. Specification of Digital Penning Gauge: <ul style="list-style-type: none"> <li>- Pressure range : <math>10^{-3}</math> to <math>10^{-7}</math> mbar.</li> <li>- Construction : Metal construction.</li> <li>- Response time : 0.5 Sec.</li> <li>- Operating voltage : 2 KV DC.</li> <li>- Input Voltage : 230V AC, 50 Hz.</li> <li>- Coupling: KF 25 Quick seal coupling</li> </ul> </li> </ul>
7.	<b>MOUNTING:</b>	<p>All the above components should be compactly and aesthetically housed in a state of the art frame made out of MS material. The front panel should be provided for mounting vacuum gauge. Rotary pump should be mounted inside the cabinet on a suitable support. The pump should be connected to the main unit through a vibration damping flexible corrugated bellow (SS304) of convenient length. The pump exhaust should be terminated at the back of the unit so that it can be connected to a point outside the room if necessary.</p>

		Anti-vibration mounts for rotary vacuum pump should be provided for the reducing the vibrations.
8.	<b>Leak Testing</b>	All individual components as well as total system should be leak tested and demonstrated using Helium Mass Spectrometer leak detector to an individual leak rate better than $1 \times 10^{-9}$ std.cc/sec.
9.	<b>Water Chiller</b>	A suitable chiller of reputed make for water cooling of various parts of the unit should be provided with the following features: <ul style="list-style-type: none"><li>- ON / OFF Control and indication</li><li>- Digital display controller</li><li>- Display of water temperature</li><li>- Capacity: 0.5 TR Water Chiller as required –1 Phase with PID Controller</li></ul>