



Limited Tender for a Radio Frequency (RF) & Direct Current (DC) Magnetron Sputtering Unit.

Only Indian manufacturers are allowed to participate.

CeNSE is a multidisciplinary research department at IISc that houses a 14,000 sq. ft. cleanroom and characterization facility used by 50 faculty members from various disciplines at IISc. Consequently, any tool in CeNSE receives significant exposure to scientific community at IISc and beyond. The vendors are requested to factor in the value of this exposure in to their quotes.

<http://nnfc.cense.iisc.ac.in/>

<http://www.mncf.cense.iisc.ac.in/>

<https://www.inup.cense.iisc.ac.in/>

Procedure

1. Vendors will be required to submit a technical proposal and a commercial proposal in **two separate sealed envelopes**. Only vendors who meet the technical requirement will be considered for the commercial negotiation.
2. **The deadline for submission of proposals is 16th April 2021 5 PM.** Proposals should arrive at the National Nanofabrication Centre (NNFC), Indian Institute of Science, Bangalore 560012, India, by the above deadline.
3. The decision of purchase committee will be final.
4. The technical proposal should contain a compliance table with 5 columns. The first column must list the technical requirements, in the order that they are given in the technical configuration below. The second column should describe your compliance in a “Yes” or “No” response. If “No” the third column should provide the extent of the deviation (please provide quantitative responses). The fourth column should state the reasons for the deviation, if any. The fourth column can be used to compare your tool with that of your competitors or provide details as requested in the technical requirements table below.



5. Any additional capabilities or technical details, that you would like to bring to the attention of the purchase committee, can be listed at the end of the technical table.
6. Vendors are encouraged to highlight the advantages of their tools over comparable tools from the competitors.
7. If multiple systems can fulfill the requirements, vendors can submit multiple bids.
8. In the commercial bid, please provide itemized cost of the system and required accessories, such as software, power supply, etc.
9. As an option, please provide itemized cost for any suggested accessories/add-ons that may enhance the usability, capability, accuracy or reliability of the tool. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
10. The quotes should be FOR Indian Institute of Science, Bangalore in Indian Rupee only.
11. Please indicate the warranty provided with the tool. **Warrant of 1 year** is preferred.
12. Provide itemized cost for required spares for 2 years of operation. For sake of this calculation, the vendor may assume active tool usage of 20 hours/ week. This number will be used to estimate the life cycle cost of the tool.
13. If maintenance requires, as an additional option, provide cost of an annual maintenance contract (AMC) for 3 years, post warranty. The **AMC must cover 2 scheduled and 2 emergency visits per year**. The AMC cost must also include an itemized list of spares that are essential for the scheduled visits.
14. The **RFQ must include references of minimum 5 previous installations, preferable in India**. Please provide the names and contact addresses of the referees, so that the committee can contact them independently.
15. Any technical questions can be directed to S. Varadharajaperumal (varadhu@iisc.ac.in), Technology Manager, NNFC, IISc., Bengaluru and Dr. Savitha (savithap@iisc.ac.in), COO, NNFC, IISc., Bengaluru.

Technical Requirements

1.	Primary application	<ul style="list-style-type: none">• RF & DC magnetron Sputtering system.
2.	Magnetron Sputtering System	<p>a).<u>Vacuum Chamber:</u></p> <ul style="list-style-type: none">• Material of Construction (MOC): SS 304 grade or better.



		<ul style="list-style-type: none">• Chamber size: Approximately 500 mm (W) X 500 mm (D) X 500 (H) [minimum requirement].• A front opening quick access door for loading & unloading of the substrates and materials. Removable chamber top plate with vacuum penetrations.• Necessary ports required for pumping, magnetrons, Gas Inlet, vent, gauge, feedthrough, port for substrate heaters and rotation mechanism etc.• One high vacuum compatible, toughened glass view port with a manual shutter to avoid material deposition on the view port on the door.• One set of removable stainless steel liners for easy cleaning. <p>b). <u>Magnetron Sources:</u></p> <ul style="list-style-type: none">• Three numbers of 3” Dia. indirectly water cooled circular magnetron cathode with bellows for flexibility.• Confocal type with sputter up arrangement.• Provision for substrate to target distance is required.• Electro pneumatically operated shutter for each magnetron source. <p>b). <u>Substrate Holder, Heater & Rotation:</u></p> <ul style="list-style-type: none">• A substrate holder should handle up to a 4 inch dia. substrate. Also permit to place small irregular pieces of wafers (suitable clips should be provided to hold samples onto the holder).• The thickness uniformity should be $\pm 4\%$ over 100mm (4 inch) diameter substrate. A measurement certificate of thickness uniformity of any metal (for example Al/Au/Ag) on Si substrate of appropriate size should be provided. The thickness should be measured using standard characterization techniques showing variation of thickness along the radius of the Si substrate. The committee reserves the right to verify the certificate and thickness uniformity at the customer
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		<p>site/manufacturer site. Manufacturer has to arrange the necessary facilities for assessing uniformity.</p> <ul style="list-style-type: none"> • Motorized linear Z movement. • Substrate rotational capability at elevated temperature. Provision of simultaneous rotation & heating mechanism. • Rotation speed adjustable up to 20rpm. • A suitable heater should be provided for varying temperature from RT to a maximum of 600 °C with a thermocouple and PID temperature controller. Temperature accuracy should be within $\pm 1^\circ\text{C}$. • The substrate heater should be oxygen compatible up to maximum temperature. • RF Substrate biasing facility. <p>c). <u>RF Power Supply:</u></p> <ul style="list-style-type: none"> • One number of RF 600 Watts power supply of good quality (imported) with auto matching network & necessary connectors and cables for magnetron sputtering. • Frequency: 13.56 MHz. • 1 IN 2 OUT RF Switch Box for directing the power between the magnetron and substrate <p>d). <u>DC Power Supply:</u></p> <ul style="list-style-type: none"> • One number of DC 1.5kW power supply of good quality (imported) with necessary cables and connectors for magnetron sputtering. <p>1 IN 2 OUT DC Switch Box to direct the power in between two magnetrons.</p>
3.	Vacuum Pumping System	<p>a). <u>High vacuum pump:</u></p>

		<ul style="list-style-type: none"> • A Turbo molecular pump (LEYBOLD/ALCATEL/VARIAN/EDWARDS or equivalent) having suitable pumping speed (minimum 500 lit/sec) to achieve chamber vacuum level at least 5×10^{-7} mbar. • Ultimate Pressure: $\leq 5 \times 10^{-7}$ mbar to be achieved. <p>b).<u>Dry Scroll pump:</u></p> <ul style="list-style-type: none"> • Dry scroll pump (10 m³/hr or higher) (Make ANESTA IWATA/LEYBOLD / EDWARD / VARIAN or equivalent) for roughing and backing operations. <p>c).<u>Vacuum and High Vacuum Valves:</u></p> <ul style="list-style-type: none"> • Electro pneumatically operated right angle for roughing, backing and high vacuum applications. • Vent valve, fine control needle valves to be provided. • Three positions, electro pneumatically operated gate valve. <p>c). <u>Vacuum Gauges:</u></p> <ul style="list-style-type: none"> • Imported Pirani & Penning Gauges for vacuum measurement.
4.	Load Lock	<ul style="list-style-type: none"> • The system comprises a load lock chamber with an access door for a single sample of up to 100mm/4inch diameter, plus connection to the process chamber, sample transport and vacuum pumping. • Connection to chamber via a pneumatically operated gate valve. Interlocking should be provided to prevent inadvertent operation of the gate valve. • 6m³/hr or more rotary pump for evacuation of Load Lock chamber. Provision of needle valve for purging Ar gas. • Vacuum gauge for pressure measurement. • A motorized z-shift is provided for the work holder to allow transfer from and to the transfer arm.
5.	Safety and Interlocks	<ul style="list-style-type: none"> • Electrical overload protection. • Mains Indication lamp.



		<ul style="list-style-type: none">• Emergency ON/OFF Switch.• Vacuum switch interlocked with cathode power supply for avoiding switching-ON of power sources without vacuum. Safety panel switches to cut off source power supply, if doors open.• A water flow switch in the water circulation line of the unit protects the turbo molecular pump incase of water supply failure/low pressure by switching off the turbo molecular pump.• All major electrical circuit is provided with fuse.• All major components will be connected through circuit breaker and contactor.
6.	Process gas manifold	<ul style="list-style-type: none">• Mass flow controlled gas line for Argon to control flow upto 200 sccm with isolation valves and filter.• Mass flow controlled gas line for Oxygen to control flow upto 100 sccm with isolation valves and filter.• Ar gas line should be plumbed to all the 3" sources, with control valves to direct the flow to one or all sources• O₂ gas line should be plumbed to substrate for reactive sputtering.• Pressure control during deposition - Multi-position/Butterfly valve based automatic controller.
7.	Control panel	<ul style="list-style-type: none">• System should have a high stability, industrial grade PLC.• User Operation should be using touch screen HMI.• The system should have easy-to-use & intuitive software.• System Operation via a menu-driven interface.• Users are able to edit, save and load multiple recipes.
8.	Utilities	<ul style="list-style-type: none">• Details to be provided in the offer for space, power supply, gases, etc for system operation.
9.	Inspection and Acceptance Test	The vendor or the OEM has to demonstrate the following during the pre-dispatch inspection,



		<ul style="list-style-type: none">• Ultimate vacuum of 5×10^{-7} mbar in clean empty chamber.• The vacuum leak rate of 3×10^{-9} std. cc/sec. using MSLD.• The thickness uniformity $\pm 4\%$ or better over a 4 inch substrate.
10	Warranty	<ul style="list-style-type: none">• 12 months from the date of commissioning and acceptance of equipment.
11	Eligibility Criteria	<ul style="list-style-type: none">• The bidder must have supplied similar systems to at least 10 educational institutes/universities and/or research organizations and at least three to the CFTI's in India along with contact details.• Original Invoice, Original Warranty Certificate, Original Test Reports should be produced for all imported items from OEM (Original Equipment Manufacturer) at the time of supply of the equipment.• System Catalogue should be produced with the Technical Bid.• CE Certification must be provided for the proposed system. The CE certificate should be provided with the Unit.• Manufacturer should have ISO or equivalent international standard certificate.• Supplier will support the user with all the spares for a minimum period of 10 years.• Details of experienced service engineer including contact detail should be provided in tender document.• Bidder shall have to submit audited accounts (Balance sheet profit and loss account) of financial year 2017-18, 2018-19 and 2019-20. Audited statement must be signed and stamped by qualified chartered accounted. Income Tax return for assessment year – 2017-18, 2018-19 and 2019-20.• Up to date sales tax or GST clearance certificate.• The thickness uniformity $\pm 4\%$ or better over a 4 inch substrate. Coating Sample with uniformity and thickness measurement report should be submitted along with the bid.

