



To Whom It May Concern

Domestic Tender to supply Scrubber System by local vendor only.

This is an RFQ (Request for Quote) for procurement of e-beam evaporation tool as part of an open tender for the Centre for Nano Science and Engineering (CeNSE) at IISc, Bangalore. The tender invitation is for Indian Original Equipment Manufacturer (OEM)/Class-1/Class-2 or their Indian authorized distributor only.

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. CeNSE is also a user-facility which has hosted over 6000 participants from more than 700 universities and institutes all over the world. Consequently, any tool in CeNSE receives significant exposure to scientific community in India and beyond. The vendors are requested to factor in the value of this exposure in to their quotes.

Being a user-facility puts additional technical burden on the tool. We need a tool that can tolerate heavy usage (at least 50 hours/week), has a high uptime, can be serviced and maintained for the foreseeable future (at least 5 years), and has a track record of reliability at comparable facilities in India and abroad. Details of existing facilities and the user program can be gleaned from:

<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 8th July 2022, 5:30 pm Indian Standard Time**. Proposals should arrive at the Main office, GF-15, Centre for Nano Science and Engineering, 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 commercial comparison will be done as per Government of India rules, specifically GFR 2017. Note that GFR has recently been amended.
11. As per recent edits to the GFR, there are three classes of vendors distinguished by their “local content”. In the cover letter, vendors must mention which applies to them:
 - Class 1 supplier: Goods and services have a local content of equal to or more than 50%
 - Class 2 supplier: Goods and services have a local content more than 20% but less than 50%
 - Non-local supplier: Goods and services have a local content of equal to or less than 20% 5.Quotes will be entertained from Class 1 or Class 2 suppliers only.
12. Please indicate the warranty provided with the tool. Warranty of 3 years or more is preferred.
13. The quotations should be on FOR-IISc Bangalore basis in INR only.
14. 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.
15. Clarify if periodic (preventive) maintenance be done by a trained on-site engineer or requires a specialist from the OEM.
16. If maintenance requires OEM, as an additional option, provide cost of an annual maintenance contract (AMC) for 3 years, post warranty. The AMC must cover 1 scheduled and 1 emergency visit per year. It must also indicate who will service the AMC, an Indian agent or the OEM. The AMC cost must also include an itemized list of spares that are essential for the scheduled visits.
17. The RFQ must include references of 3 previous installations, preferable in India. Please provide the names and contact addresses of the referees, so that the committee can contact them independently.
18. Any questions can be directed to Dr. Savitha P, GF-20, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India. (savithap@iisc.ac.in)

Technical Requirements

1.	APPLICATION	<ul style="list-style-type: none"> Sputtering tool to deposit a variety of thin films from metals to dielectrics.
2.	CHAMBER	<ul style="list-style-type: none"> Arrangement for magnetron sputtering cathodes in SPUTTER UP configuration. Strictly 1000 class Cleanroom compatible material. Material of Construction (MOC): SS 304 grade or better, non magnetic, water cooled, bakeable to 150°C. DC/RF compatible structure. Electro-polished from inside. Removable shields/liners to minimize deposition on chamber walls. Suitable view ports, shuttered and bolted for monitoring of sources and substrate, fully inside the chamber view and plasma. Leak test port for He leak detector or RGA. CFF spare ports with blank for future additions.
3.	PUMPING	<ul style="list-style-type: none"> The base pressure for a properly conditioned, clean, dry and empty chamber with copper and Viton gaskets should be 2×10^{-7} Torr or better. Pressure of $<1 \times 10^{-6}$ Torr achieved in 15 minutes and a pressure of $<2 \times 10^{-7}$ Torr in less than 60 minutes. Combination of a turbo pump and a DRY backing/roughing pump. <p>High vacuum pump:</p> <ul style="list-style-type: none"> A Turbo molecular pump (PFEIFFER/LEYBOLD/ALCATEL/VARIAN/EDWARDS or equivalent) having suitable pumping speed (minimum 500 lit/sec) to achieve the above specifications. <p>Should include pump down curves along with the technical bid. Chamber base pressure and time to reach base pressure given the pumping capacity should be specified.</p> <p>Dry Scroll pump:</p> <ul style="list-style-type: none"> Dry scroll pump ($10 \text{ m}^3/\text{hr}$ or higher) (Make PFEIFFER/ LEYBOLD / EDWARD / VARIAN or equivalent) for roughing and backing operations. <p>Vacuum and High Vacuum Valves:</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.

		<ul style="list-style-type: none"> Electro pneumatically operated gate valve. Gate valve should be suitable for Throttling while sputtering process. Gate Valve fully integrated with the HMI. Gate valve of SS construction and HV or VAT make. <p>c). Vacuum Gauges:</p> <ul style="list-style-type: none"> Pirani & Penning Gauges (INFICON / AGILENT / Pfeiffer/Edwards makes only) for vacuum measurement.
4.	Gas Flow Manifold	<p>Reactive process gases should ideally be admitted away from target surface. Only one source could be plumbed with reactive gases and Ar through sputter source gas rings.</p> <ul style="list-style-type: none"> Mass Flow Controllers(Make: ALICAT/ BRONKHORST/AALBORG or EQUIVALENT) Argon– 200sccm [max] (1no.) Oxygen–100 sccm [max] (1no.) Control Electronics with set point control and digital display of Flow rate in sccm Gas Inlet Valve (Isolation) -1no. Electro pneumatically Operated Micro-switch for OPEN indication and interlock. <ul style="list-style-type: none"> Gas Mixing Chamber and all SS Tubing with Swagelock compatible fitting Additional 2 or 3 Feed through required for other gases
5.	SUBSTRATE	<ul style="list-style-type: none"> Multiple substrate holders with planetary and uniaxial rotation capability that allows for conformal coatings. Deposition on small cut pieces (1cm x 1cm) to 4 inch substrates. Rotation built in and heating substrates up to 600°C with +/- 1°C accuracy. Substrate RF/DC biasing capability while rotating / heating / depositing on one holder. The substrate heater assembly should be capable of being operated in vacuum of $\sim 2 \times 10^{-7}$ Torr as well as in oxygen ambient. Details of fixturing for wafers of different sizes should be included. Clips and mounting fixtures should be such that they do not introduce a point load that will can introduce wafer defects and/or cause breakage. The ability to adjust source to target distance should be included.
6.	RF Power supply	<p>RF Generator with AutoMatching Network RF Power: 600Watts or better (Advance energy, BARTHEL, Germany or Seren, USA or equivalent) Power supply to Magnetron cables should be original from power supply manufactures.</p>

7.	Pulsed DC power supply	<p>Power: 1 kW or higher 0-500mA or better. Direct Digital indication of Cathode Voltage and Plasma Operation in Pulsed DC Mode Pulse Frequency:1-30KHz or better, Duty Cycle: 20%-90%or better Active Arc Suppression Circuitry. Power supply to Magnetron cables should be original from power supply manufactures DC Bias: 1000W- 880v/1.7A or better</p>
8.	Magnetron cathode assembly	<ul style="list-style-type: none"> • 3" Magnetron cathodes assembly in Sputter Up configuration, 3 nos. + 1 optional. • Confocal mounting geometry to concentrically face substrate holder. • RF/DC/Pulsed DC compatible • Integrated gas inlet assembly to provide uniform erosion • High Target utilization • Inbuilt arrangement of magnets in the sputter gun to confine the plasma close to the target and get high sputtering yield. • All Stainless-Steel Integrated Shutter Assembly [Electropneumatic/ motor based] <ul style="list-style-type: none"> • Micro-switch arrangement for Target identification for Power Supply • Water Flow Switch Interlock for each Magnetron.
9.	FILM UNIFORMITY	<ul style="list-style-type: none"> • Thickness uniformity in single wafer deposition and for batch across all wafers should be better than $\pm 3\%$. • A map of uniformity across 2 inch, 3 inch, and 4 inch wafers should be demonstrated. • Direct Deposition Uniformity With 3" Magnetron Sputtering Source: better than $\pm 5\%$ over a 2" diameter wafer required.
10.	OTHERS	<ul style="list-style-type: none"> • Suitable shutter below the substrate plane. Pneumatically controlled Source Shutters for the sources.
11.	SYSTEM CONTROL	<ul style="list-style-type: none"> • Machine parameters controlled through a PLC and accessible through a human machine interface (HMI) or a laptop. • Process recipes for deposition of selected materials should be provided and should be programmable through the HMI. • Safety interlocks on the system and the cause/effect diagram that summarizes these safety features should be provided. • Complete logs of all the process and system parameters to be available and stored for future trouble shooting • Graphical representation of tool and process parameters • Provision to alert the user in case of emergencies and an option to integrate the alarm system to NNFC building monitoring software

		<ul style="list-style-type: none"> • Software need to be supported for the lifetime of the tool.
12.	INSTALLATION AND TRAINING	<ul style="list-style-type: none"> • Installation and demonstration of tool functionality at customer site, by the experts from principals should be part of the package. • During the installation all the specifications of the processes should be verified for acceptance by the customer. • Tool training for 3 people should be a part of installation. • Must provide the list and contact addresses for minimum 10 installation to Micro/ Nano fabrication cleanrooms in India and abroad
13.	POWER & UTILITIES	<ul style="list-style-type: none"> • A floor plan and list of utility requirements needed. System should be compatible with 240±10V, 50 Hz single phase or 415±20V, 50 Hz 3 phase supplies. • Any additional power or utility requirement arising from this tool should be clearly mentioned
14.	SAFETY	<ul style="list-style-type: none"> • The tool should be designed to minimize all risks of injury to users. • Equipment shall be in full compliance with government and commercial safety and health and environmental regulations and requirements. • An emergency off (EMO) button easily visible and accessible to users in case of emergency should be provided. • Auto shutdown of power supplies if: plasma not detected • Auto abort of process if: plasma not detected / gas flow setpoint or temperature setpoint not reached
15.	ACCEPTANCE TESTS	<ul style="list-style-type: none"> • Base Vacuum: better than or equal to 2.0 x 10⁻⁷ Torr with vacuum pumping system. • Pumpdown to 2 x 10⁻⁷ Torr in 60 minutes or less. • Confocal Deposition Uniformity: better than +/- 3 % over a 4" diameter wafer. • Direct Deposition Uniformity With 3" Center Magnetron Sputtering Source: better than +/- 5% over a 2" diameter wafer
16.	SUPPLY OF SPARES	<ul style="list-style-type: none"> • Quote should include a list of spares that need to be replaced periodically to ensure that the system is in operation.
17.	MAINTENANCE	<ul style="list-style-type: none"> • Availability of trained engineers in India for servicing is a must. • System operation, process and troubleshooting manuals and detailed drawings are required. • A set of basic tool required for routine maintenance should be included.
18.	SUPPORT	<ul style="list-style-type: none"> • Capability for online diagnostics from a remote location in case of tool problems.



		<ul style="list-style-type: none">• Provide details of after sales service and support available in India. Provide details of trained personnel in India authorized to service the machine, and number of tools sold in India.
19.	SHIPPING	<ul style="list-style-type: none">• Cost of shipping up to IISc, Bangalore.
20.	PAYMENT TERMS AND CONDITIONS	<ul style="list-style-type: none">• 90 % Letter of Credit; 10% of payment after instruments have been installed and successfully demonstrated.