



Society for Innovation & Development  
an IISc initiative

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### Request for Quote and Specifications of sputtering tool for deposition on up to 8” substrates

- The GEECI (Gallium Nitride Ecosystem Enabling Centre and Incubator) at SID-Indian Institute of Science is seeking bids from qualified industries for an sputtering tool as per the specifications below.
- Companies need to submit two bids, a technical bid and a commercial bid, in **two separate** sealed envelopes. The bids should be submitted no later than 30 days from the date of posting of this tender, as listed on the website date/time stamp, and by 5 pm on the 30<sup>th</sup> day or next weekday in case the 30<sup>th</sup> day falls on a weekend or a national holiday.
- Both technical and commercial bids should be addressed to “The Chief Executive, SID, IISc, Bangalore 560012, GST # 29AAATS5333E1ZJ.”
- All quotations should be CIF Bangalore.
- Cost of last mile transportation, including any insurance, from port of shipment to IISc has to be quoted as an option.
- In case of courier shipments maximum permissible weight would be 70kgs.
- The envelopes should be addressed to “Prof. Srinivasan Raghavan, CeNSE, IISc, Bangalore, 560012” and submitted to the office at CeNSE, IISc in Room No. GF 15 between 9 am and 5 pm.
- All questions regarding this tender should be addressed to Prof. Srinivasan Raghavan at the email address [sraghavan@iisc.ac.in](mailto:sraghavan@iisc.ac.in)
- Post such submission all vendors should send an email to [sraghavan@iisc.ac.in](mailto:sraghavan@iisc.ac.in) with the subject line: “GEECI\_Bidder’s name\_Tool Name” to intimate him of the submission within one day.
- Deviations from the technical specifications requested are allowed. Such deviations must be highlighted and justified. Their acceptance or rejection will be left to the discretion of the technical committee.
- The equipment sought will be placed at the Centre for Nano Science and Engineering (CeNSE), Indian Institute of Science (IISc). IISc is India’s No. 1 institution on higher learning and the Center for Nano Science and Engineering is home to one of the best academic fabs in the world.
- The technical response, corresponding to the tool being offered, should be in the form of a compliance table with at least 5 columns. Serial number in column 1. Each of the row wise items below should be addressed in a separate row of the table in column 2. Compliance to this requirement, in Yes/No, deviation from it and justification should be provided in the neighboring columns 3-5. Post the opening of a hard copy of the technical bid the committee will request for a soft copy of the files for further processing. Companies should **NOT** mail soft copies of the files unless specifically requested for.
- Detailed technical specifications of the tool being offered should be included.
- 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.
- If multiple systems can fulfill the requirements, vendors can submit multiple bids.
- Vendors are encouraged to highlight the advantages of their tools over comparable tools from the competitors.
- The commercial bid should be broken up to the maximum extent possible into separate items with a cost against each to enable better comparison of price for various configurations across the bidders. 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.

1.	<b>Primary application:</b> Magnetron sputtering system for thin film deposition (metals such as Au, Ni, Ni-Cr alloys, Ti-W alloys and insulating materials such TaN) on upto one 6” substrate. However, if the same 6” tool can also handle 8” substrates, vendor may highlight the same. Qualification will be on a 6” substrate.
2.	<b>Chamber:</b> Preferably SS. If any other material, please specify. Cost of SS upgrade <u>should</u> be included as an option. A preferable chamber configuration is one that has a removable top plate with vacuum feed throughs. One set of removable stainless steel liners for easy cleaning.
3.	<b>Pumping:</b> The chamber volume and the capacity of the pumping provided should be such that a pressure of $<1 \times 10^{-6}$ Torr is achieved in 15 minutes and a pressure of $<1 \times 10^{-7}$ Torr in less than 60 minutes. While these are guideline figures, a tool that allows for the least cycle time, given the requirement specified would be preferred. Tool vendors should include pump down curves along with the technical bid. Chamber base pressure and time to reach base pressure given the pumping capacity <u>should</u> be specified
4.	<b>Pumping:</b> It is preferred that the above pumping be achieved with a combination of a (preferably) turbo pump (preferably Pfeiffer) and a <b>DRY</b> backing/roughing pump. A cryo-pump option should be included.
5.	<b>Pumping/Loadlock:</b> For the single wafer configuration, a load lock, automated cassette (4, 6 and 8”) <u>and</u> manual, that allows changing of wafers <u>must</u> be quoted as option/options.
6.	<b>Pumping/Loadlock:</b> The possibility of getting down to a base pressure of $1 \times 10^{-9}$ Torr with a suitable combination of pumping system + load lock should be quoted as an option.
7.	<b>Pumping/Loadlock:</b> The possibility of getting down to a base pressure of $1 \times 10^{-9}$ Torr with a suitable combination of pumping system + load lock should be quoted as an option.
8.	<b>Pumping/Pressure control:</b> Details of the closed loop pressure control implemented during deposition though a combination of pressure sensor, control valve and feedback mechanism should be specified.
9.	<b>Substrates:</b> The sputtering system is being procured for deposition on up to 6 inch substrates in 1x6” configuration
10	<b>Magnetron Sources:</b> Four numbers of 3” Dia. indirectly water-cooled circular magnetron cathode with bellows for flexibility in <u>confocal type</u> with <u>sputter up</u> arrangement. Technical bid should include the details of the magnetron specification and manufacturer if not from the vendor’s company.
11	<b>Magnetron Sources:</b> Provision for varying substrate to target distance is required.
12	<b>Magnetron Sources:</b> Electro pneumatically operated shutter for each magnetron source should be provided.
13	<b>Magnetron Sources:</b> Specify if they are ultra high vacuum, $<10^{-6}$ Torr, compatible or not.
14	<b>Ion Source:</b> An ion source that can be accommodated in the chamber in addition to the 4 magnetron sputter heads should be quoted as an option for purposes of substrate cleaning and ion beam assisted deposition.
15	<b>DC Power Supply:</b> One number of DC power supply for magnetron sputtering. Quote for both 1 kW and 1.5 kW as separate options. Technical bid should include the details of the source specification and manufacturer if not from the vendor’s company.
16	<b>RF Power Supply:</b> One number of RF power supply for magnetron sputtering. Quote for both 300 W and 600 W sources as separate options. Technical bid should include the details of the source specification and manufacturer if not from the vendor’s company.
17	<b>Switch:</b> 2 sources in and 4 sources out switch.
18	<b>Polarity switching:</b> Tool should allow for polarity to be flipped between the gun and the substrate to permit pre deposition sputter cleaning of the wafer.

19	<b>Substrate Holder:</b> A substrate holder should handle up to a 6-inch dia and should be capable of holding small irregular pieces of wafers (suitable clips should be provided to hold samples onto the holder).
20	<b>Substrate Rotation:</b> Substrate rotation of about 25 RPM is a must.
21	<b>Substrate heating:</b> Quote as an optional item.
22	<b>Film Uniformity:</b> Vendor should specify the thickness uniformity possible in single wafer deposition in +/- x% format for Au deposition by DC and TaN deposition by RF. A map of uniformity across 6 inch wafers should be submitted with the quote for as many of the materials to be deposited and listed in item 1.
23	<b>Deposition rate monitoring:</b> Quartz crystal monitors should be provided to monitor deposition rates at the substrate plane.
24	<b>Deposition rate monitoring:</b> Number of sensor heads in the QCM should be provided. The system should have the capability if switching sensors should there be failure in the middle of a run to ensure prevention of loss of the run itself.
25	<b>Gas flow:</b> 2 gas flow lines with a single mass flow controller and suitable valving should be provided for flushing the chamber. This should be quoted on a per line basis as an option. We expect a requirement for Ar and N2.
26	<b>View ports:</b> The system should have view ports, suitably shuttered and bolted to the system through conflat metal seals that allows for monitoring of the process without getting coated.
27	<b>Leak test port and He leak integrity:</b> The system should have a He leak integrity of $4 \times 10^{-9}$ sccs of He or better and should have an easily accessible He leak test port for trouble shooting.
28	<b>System control:</b> All important machine parameters should be controlled through a PLC and accessible through a touch pad human machine interface (HMI) or a laptop. A list of parameters that are logged and/or controlled should be included in the technical bid.
29	<b>System control:</b> In the automated load lock option, programming of different deposition recipes to be implemented on different wafers in the automated cassette as and when they are loaded into the chamber should be allowed and quoted as an option if not included in the software already. For instance one should be able to deposit Au on Wafer 1 in the cassette and Ni on Wafer 2 in the cassette.
30	<b>System control:</b> A list of all safety interlocks available on the system and the cause/effect diagram that summarizes these safety features should be part of the technical bid. <b>Required Safety and Interlocks:</b> <ul style="list-style-type: none"> <li>• Electrical overload protection.</li> <li>• Mains Indication lamp.</li> <li>• Emergency ON/OFF Switch.</li> <li>• 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.</li> <li>• 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.</li> <li>• All major electrical circuit is provided with fuse.</li> <li>• All major components will be connected through circuit breaker and contactor.</li> </ul>
31	<b>Process recipes:</b> Process recipes for deposition of the said metals and other should be provided and should be programmable through the HMI. Vendors who have optimized process recipes and demonstrate these during installation will be preferred.
32	<b>Qualification and Acceptance Criteria:</b> Thickness uniformity $\pm 5\%$ or better over a 6 inch substrate of selected materials. Commissioning shall involve demonstration of growth of

	single or multiple metal layers mutually agreed upon between the client and vendor and characterized by the client within time frames agreed upon. Details of the stage wise certification protocols to be pursued for tool acceptance should be included in the technical bid. The PO will include a mutually agreed upon set of tool qualification criteria. Please list a set of acceptance tests for on-site (vendor) inspection and after installation at IISc.
33	<b>SEMI Standards:</b> The technical bid should include details of the SEMI standards the tool confirms to.
34	<b>Clean Room Compatibility:</b> The system should be compatible with better than class 1000 cleanroom environment.
35	<b>Shipping:</b> On all systems the cost of shipping up to IISc should be included. IISc will help with customs clearance at Bangalore Airport. Please include your payment option. IISc would prefer to retain at least 20% of payment till instruments have been commissioned and successfully demonstrated.
36	<b>Tool Training:</b> The bid should include as an option the cost of training personnel on site before shipment and post installation at IISc.
37	<b>Tool footprint and utilities:</b> A floor plan should be part of the technical bid. A list of utility requirements should be part of the technical bid. The system should be compatible with 240±10V, 50 Hz single phase or 415±20V, 50 Hz 3 phase supplies. The <b>MINIMUM</b> set of utility requirements needed are provided in Table 1. If there are additional utility requirements please include them in the technical bid. <b>Please list connector types for all utilities.</b>
38	<b>Cost of Ownership and supply of spares:</b> The quote should include a listing of spares that need to be replaced periodically to ensure that the system is in operation in a stable fashion – the stability parameters being defined by the vendor and agreed to by the client – the cost of such items, the ability to guarantee their availability at this cost for a period of 5 years from the time of procurement. The aim of this exercise is to compare cost of ownerships between reactors.
39	<b>Maintenance:</b> The cost of an annual maintenance contract and cost of emergency technical support that may involve an engineer being on site should be quoted for in the commercial bid and addressed in the technical bid. The availability of trained engineers in India for servicing the system will be preferred and should be described in the technical bid.
40	<b>Maintenance:</b> On all systems a set of basic tools required -non-standard screw or spanner head that is required for routine tool maintenance should be mentioned- for performing routine maintenance should be included.
41	<b>Maintenance:</b> System operation, process and troubleshooting manuals and detailed drawings are a must. Their inclusion must be indicated in the technical bid.
42	<b>Online support:</b> System should have the capability for online diagnostics from a remote location in case of tool problems.
43	<b>Post sales service and Indian Presence:</b> Bidders should provide details of after sales service and support and in particular that available in India. If not India, the nearest geographical location should be specified. Please provide details of the number of trained personnel in India who can service the machine, the number of tools sold in India and the corresponding number in the southern region or in Bangalore.
44	<b>Payment Terms and Conditions:</b> On all systems the payment terms should be specified in the technical and commercial proposal and is subject to negotiation. Please include your payment option. IISc would prefer to retain at least 20% of payment till instruments have been commissioned and successfully demonstrated.
45	<b>References:</b> Bidders should provide details of other locations in India with similar tool installations.

46	<b>References:</b> Bidders should provide details of at least 3 other locations globally where similar tool installations have been deployed for device fabrication in a clean room preferably for production purposes.
47	<b>Company financials:</b> Bidder shall have to submit audited accounts of financial year 2017-18, 2018-19 and 2019-20. Audited statement must be signed and stamped by qualified chartered accountant. Income Tax return for assessment year – 2017-18, 2018-19 and 2019-20.
48	The following documentation should be provided. ISO9001 quality certification. CE marking confirmation.
49	<b>III-V nitride processing:</b> Please include information on whether the tool and its fixturing has been used for deposition of the said metals on GaN on Si wafers of 6” diameter for power applications.

