



Request for Quote and Specifications of 6 plasma based tools for deposition and etching in GaN process development

- The GEECI (Gallium Nitride Ecosystem Enabling Centre and Incubator) at SID-Indian Institute of Science is seeking bids from qualified industries for a set of 5 plasma based tools 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 30th day or next weekday in case the 30th 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
- Post such submission all vendors should send an email to 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 numbered technical 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.

I. PECVD tool for dielectric deposition		
1.	Primary application	<ul style="list-style-type: none"> • For deposition of SiN, SiON with ability to tune RI, the stress of the films. • Deposition thickness 100-500 nm. • Technical bid must include details of the SEMI standard the equipment confirms to such as for e.g. SEMI-S1-1015, SEMI S2-1016B, SEMI S28-1011 etc.
2.	Secondary application	<ul style="list-style-type: none"> • Deposit SiO₂
3.	Chamber type	<ul style="list-style-type: none"> • PECVD/ICP CVD
4.	Process capability	<ul style="list-style-type: none"> • Depositing SiN, SiON and SiO₂, with thickness non-uniformity of <3% across the wafer and also wafer to wafer. • Refractive index and stress should be tunable. • Please specify conformality. • Please specify breakdown voltage. Process recipes and tools that offer higher breakdown voltage is preferred. • Provide detailed technical literature for the system use, such as your prior experience and technical data on the deposition processes and tool capabilities. • Film characteristics such as breakdown voltage, refractive index range, stress range, buffered HF etch rate are critical parameters that will be used to compare process competency between vendors.
5.	Process recipes	<ul style="list-style-type: none"> • At the time of installation, all standard process recipes should be provided, detailed process recipe.
6.	Substrate details	<ul style="list-style-type: none"> • Processing of 6-inch wafers. • However, we need suitable substrate adapters to process 4-inch, 3-inch, 2-inch and cut pieces of substrates measuring more than 2cmx2cm • Should be able to handle substrates other than Si, like Alumina and SiC. • Chuck should be able to handle wafers with a bow of ~50 micrometres.
7.	Tool requirements	<ul style="list-style-type: none"> • Load lock chamber: Software controlled load and unload options • Wider matching network. • The roughing vacuum pump for the main chamber and load lock chamber should be dry pumps (preferably Edwards) with appropriate pumping capacity. Turbomolecular pump with appropriate capacity for ensuring the required process vacuum. • He backside cooling, if needed • Single wafer processing. • Upgradable to cassette processing.

8.	Electrode temperature	<ul style="list-style-type: none"> • $\leq 400^{\circ}\text{C}$
9.	Power level	<ul style="list-style-type: none"> • Typical RF Power range 100 W – 600 W, with automatic power matching unit and with an option to bias the substrate (typical range of 100 W – 600 W).
10.	Chuck configuration	<ul style="list-style-type: none"> • Quote for both Mechanical and Electrostatic chuck with the provision to handle 6-inch wafers. • Give options for the use of a 4-inch wafer as well. • Mention pros and cons of using Mechanical and ESC options.
11.	End point detection	<ul style="list-style-type: none"> • Give all the options available, itemize the cost.
12.	Process gases lines required	<ol style="list-style-type: none"> 1. O₂ 2. Ar 3. N₂ 4. SiH₄ 5. NH₃ 6. Appropriate lines for chamber clean and conditioning. <p>Please specify the ranges of the MFCs in the technical bid and include as an option the cost of adding extra gas lines in the system with software control</p>
13.	Gas Manifold	<p>The gas manifold should have 6 lines.</p> <ul style="list-style-type: none"> • MFCs need to be installed only for the lines and gases specified. All the lines should have Swagelok VCR fittings, and welding, if any, should be orbital welding. The lines should be SS316L electro-polished, suitable for corrosive and non-corrosive gases used for the specific process. MFCs should be MKS make.
14.	Leak Integrity	<p>The system should have easily accessible ports for He leak testing and should be qualified by demonstration of He leak rates less than 4×10^{-9} sccs of He when pumped down to 10^{-3} Torr or lower pressures.</p>
15.	Process software	<ul style="list-style-type: none"> • A front panel displaying equipment and process status along with appropriate software to be supplied. • The software must allow varying levels of instrument access. A simplified basic access for a user to a full access to an engineer. • Interlock that can interface with the online reservation system, so that the tools can only be used by authorized users. • Complete logs of all the process and system parameters to be available and stored for future troubleshooting • 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. • Software needs to be supported for the lifetime of the tool
16.	Gas abatement system	<ul style="list-style-type: none"> • Specify the scrubbing system needed for treating exhaust gases from the process.

17.	Safety	<ul style="list-style-type: none"> • Mention any special safety requirement of the tool. • The tool must come with a complement of interlocks to prevent common user errors. • Sensors should be provided to detect ppb levels of gas leaks and utility failures, including scrubber failure. • Any malfunction should have an audible alarm system. • Flashing lights during emergencies should also be an option.
18.	Tool qualification and Acceptance Test.	<ul style="list-style-type: none"> • Demonstrate blanket deposition of SiN and SiO₂ on a 6-inch wafer with the above-mentioned process specifications. • Please submit samples for the highest and lowest refractive index, stress levels and BHF etch rate possible with the tool. • <u>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.</u>

<p>Common Terms and Conditions: A separate table to be included for each of the items below in the technical bid.</p>
<p>SEMI Standards: The technical bid should include details of the SEMI standards the tool confirms to.</p>
<p>Clean Room Compatibility: The system should be compatible with better than class 1000 cleanroom environment.</p>
<p>Shipping: 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.</p>
<p>Tool Training: The bid should include as an option the cost of training personnel on site before shipment and post installation at IISc.</p>
<p>Tool footprint and utilities: 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 MINIMUM set of utility requirements needed are provided in Table 1. If there are additional utility requirements please include them in the technical bid. Please list connector types for all utilities.</p>
<p>Cost of Ownership and supply of spares: 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.</p>
<p>Maintenance: 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.</p>
<p>Maintenance: On all systems a set of basic tools required -non-standard screw or spanner head</p>

that is required for routine tool maintenance should be mentioned- for performing routine maintenance should be included.
Maintenance: System operation, process and troubleshooting manuals and detailed drawings are a must. Their inclusion must be indicated in the technical bid.
Online support: System should have the capability for online diagnostics from a remote location in case of tool problems.
Post sales service and Indian Presence: Bidders should provide details of after sales service and support 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.
Shipping: On all systems the cost of shipping up to IISc should be included. IISc will help with customs clearance at Bangalore Airport.
Payment Terms and Conditions: 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.
References: Bidders should provide details of other locations in India with similar tool installations.
References: 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.
Company financials: 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.
The following documentation should be provided. ISO9001 quality certification. CE marking confirmation. Must confirm to SEMI standards to be specified in the technical quoted.
III-V nitride processing: 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.

