April 15th, 2024

To Whom It May Concern

Global Tender for two Direct Writer Systems

This is an RFQ (Request for Quote) for procurement of two Direct Writer Systems as part of a global tender for the Centre for Nano Science and Engineering (CeNSE) at IISc, Bangalore.

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 also runs a program called Indian Nanoelectronics Users Program (INUP) which has allowed 4200 participants from more than 700 universities and institutes all over India to use the facilities at CeNSE. 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. Details of existing facilities and INUP 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/

Also, CeNSE hosts equipment on behalf of vendors, as a national standard or ‘model’ system. If the vendor is interested, CeNSE can consider working out a similar arrangement for the Direct Writer system.

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 the 6th May 2024, 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 the 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 CIF Bangalore, India. So please include cost of shipping.
11. Please indicate the warranty provided with the tool. Warranty of 3 years or more 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. Clarify if periodic (preventive) maintenance be done by a trained on-site engineer or requires a specialist from the OEM.
14. 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.
15. 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.
16. 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

<table>
<thead>
<tr>
<th></th>
<th>System 1</th>
<th>System 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Primary application</strong></td>
<td><strong>Primary application</strong></td>
</tr>
<tr>
<td></td>
<td>• Semi-Automatic Direct Write System with an appropriate light source</td>
<td>• Semi-Automatic Direct Write System with an appropriate light source</td>
</tr>
<tr>
<td></td>
<td>for patterning on photomasks and resist coated substrates.</td>
<td>for patterning on photomasks and resist coated substrates.</td>
</tr>
<tr>
<td></td>
<td>• Should be compatible with SEMI standards</td>
<td>• Should be compatible with SEMI standards</td>
</tr>
<tr>
<td>2.</td>
<td><strong>Resolution</strong></td>
<td><strong>Resolution</strong></td>
</tr>
<tr>
<td></td>
<td>• CDs= 1 um, Lines and Spacing = 1.5um</td>
<td>• CDs= 0.6 um, with optical autofocus</td>
</tr>
<tr>
<td></td>
<td>• Edge roughness &lt;=150nm</td>
<td>• Lines and Spacing = &lt;1um</td>
</tr>
<tr>
<td></td>
<td>• CD uniformity of &lt;=300nm across 150mmx150mm</td>
<td>• Edge roughness &lt;=50nm</td>
</tr>
</tbody>
</table>
| 3. Substrate details | Writing area of upto 150mmx150mm or better  
Write Speed minimum 40mm²/minute or better | CD uniformity of <=50nm across 150mmx150mm  
Writing area of upto 150mmx150mm or better  
Write Speed minimum 10mm²/minute or better |
|---|---|---|
| 4. Wavelength | Processing of substrates minimum 5mmx5mm to 6 inch wafers or better  
Photo masks of 3”x3” to 7x7inch or better | Processing of substrates minimum 5mmx5mm to 6 inch wafers or better  
Photo masks of 3”x3” to 7x7inch or better |
| 5. Stage | Must be in range of 350-405nm, with intensity control  
Should be compatible with standard optical resists, both positive and negative | Must be in range of 350-405nm, with intensity control  
Should be compatible with standard optical resists, both positive and negative |
| 6. Alignment accuracy | Fully motorised stage with position control by interferometer,  
Vacuum Chuck with minimum substrate size of 5mmx5mm, maximum of 7”x7” or better  
Anti-vibration table to be provided  
Substrate thickness of minimum 0.1um to 12mm  
Interferometer Resolution of 20nm or better | Fully motorised stage with position control by interferometer,  
Vacuum Chuck with minimum substrate size of 5mmx5mm, maximum of 7”x7” or better  
Anti-vibration table to be provided  
Substrate thickness of minimum 0.1um to 12mm  
Interferometer Resolution of 10nm or better |
| | TSA / 2nd layer accuracy <=0.5um  
Integrated camera system for auto alignment and substrate inspection  
Manual, Semiautomatic, automatic modes | TSA / 2nd layer accuracy <=0.25um  
Integrated camera system for auto alignment and substrate inspection  
Manual, Semiautomatic, automatic modes |
<table>
<thead>
<tr>
<th></th>
<th>Light source</th>
<th></th>
<th>Grey Scale</th>
<th></th>
<th>Metrology</th>
<th></th>
<th>Conversion software</th>
<th></th>
<th>Acceptance tests</th>
<th></th>
<th>Footprint &amp; weight</th>
<th></th>
<th>Process software</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td><strong>LED or Diode Laser, working with intensity mode preferred</strong></td>
<td></td>
<td><strong>Optional</strong></td>
<td></td>
<td><strong>Exposure mode with 128 levels or higher</strong></td>
<td></td>
<td><strong>Conversion software for DXF, CIF, GDSII, and Gerber files</strong></td>
<td></td>
<td><strong>Patterning &lt;=1.5um lines and spacing on photomask and Silicon, 4 inch wafer, 5”x5” mask</strong></td>
<td></td>
<td>The system should be compatible with better than class 100 cleanroom environment. Please specify the total footprint in cm x cm, and weight. Include if there any accessories. Appropriate table with suitable vibration isolation should be part of the quote.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Autofocus</strong></td>
<td></td>
<td><strong>Optional</strong></td>
<td></td>
<td><strong>Metrology for automatic measurement of line widths and edge roughness</strong></td>
<td></td>
<td><strong>Conversion software for DXF, CIF, GDSII, and Gerber files</strong></td>
<td></td>
<td><strong>Patterning &lt;=0.6um lines and spacing on photomask and Silicon, , 4 inch wafer, 5”x5” mask</strong></td>
<td></td>
<td><strong>Front panel displaying equipment and process status along with appropriate software to be supplied.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Optional</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>2nd layer top alignment of lines &lt;=1.0um with an accuracy of 0.5um</strong></td>
<td></td>
<td><strong>2nd layer top alignment of lines &lt;=1.0um with an accuracy of 0.25um</strong></td>
<td></td>
<td><strong>The software must allow varying levels of instrument access. A simplified basic access for a user to a full access to an engineer.</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Complete logs of all the process and system parameters to be available and stored for future trouble shooting</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Complete logs of all the process and system parameters to be available and stored for future trouble shooting</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Graphical representation of tool and process parameters</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Graphical representation of tool and process parameters</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Provision to alert the user in case of emergencies and an option to integrate the alarm system to NNFC building monitoring software</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Provision to alert the user in case of emergencies and an option to integrate the alarm system to NNFC building monitoring software</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Software need to be supported for the lifetime of the tool, if windows based, only latest version of windows will be accepted</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Software need to be supported for the lifetime of the tool, if windows based, only latest version of windows will be accepted</strong></td>
<td></td>
</tr>
</tbody>
</table>
14. Periodic Maintenance

- The system should require minimal maintenance.
- Mention the recommended preventive maintenance schedule for the system. Any accessories needed for periodic preventive maintenance for 3 years, should be mentioned in separately the itemized quote.
- Can the preventive maintenance be done by a trained on-site engineer or requires a specialist from the OEM? If the latter, please provide cost of a 3 year AMC with required kit/consumables.
- The system should be supported by a trained local representative and should have a 48hour window of response.

15. Installation and Training

- Installation and training 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.
- If periodic maintenance can be done by the on-site engineer, please include the cost of training the engineer.

16. Power & Utilities

- The instrument should work with Indian standards
- Mention the power requirement.
- Mention any utility requirement (water, air, exhaust, etc.)

17. Safety

- Mention any special safety requirement of the tool
- The tool must come with a complement of interlocks to prevent common user errors.

18. Recommendation

- The system must submit references from at least 3 previous installations
- The names and contact addresses of the referees must be submitted with the proposal, so the purchase committee can contact them independently.

19. Prior Installation

- The System of same configuration that will be quoted, should have at least 3 prior installations done and qualified in a similar fab/cleanroom like that of NNFC

20. Pre-purchase testing

- To ensure the equipment conforms for specifications, the committee requires the vendor to perform some standard tests before the purchase process is complete. The validity of the tender will hinge on the successful and accurate measurement of these test samples.
- The vendor must conclude the testing and submit the data within 1 week of receipt of samples.

21. Acceptance tests

- Patterning <=0.5um um lines and spacing on photomask and Silicon
- 2ng layer top alignment of lines <=0.5um with an accuracy of 0.3um
Thanking you,

Shankar Kumar Selvaraja, Ph.D.
Associate Professor
Centre for Nano Science and Engineering
Indian Institute of Science, Bangalore, India 560012.
Cell  : +91-
Office : +91-80-2293-3342
E-mail: savasthi@iisc.ac.in