



INDIAN INSTITUTE OF TECHNOLOGY MADRAS
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Ref: ELE/12-13/240/DRDO/BIJO

Date: 26.03.2013

Tender No.: ELE/BIJO/009/2013

N.E. Nagaraj
Special Officer (Project Purchase)
IC&SR, I.I.T. Madras

Due Date: 21.04.2013, 3:30pm

Dear Sirs,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of "ICP – RIE System" conforming to the specifications given in Annexure.

I) Instructions to the Bidder

- (i) **Preparation of Bids:-** The tenders should be submitted under two-bid system (i.e.) Technical bid and Financial bid.
- (ii) **Delivery of the tender:-** The tender shall be sent to the below-mentioned addresses either by post or by courier so as to reach our office before the due date and time specified in our Schedule. The offer/bid can also be dropped in the tender box on or before the due date and time specified in the schedule. The tender box is kept in the office of the "Special Officer, Project Purchase" IC & SR Building 2nd floor, I.I.T. Madras, Chennai – 600 036.
- (iii) **Opening of the tender:-** The offer/Bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and it will be examined by a technical committee which will decide the suitability of the bid as per our specifications and requirements. The financial offer/bid will be opened only for the offer/bids which technically meet all our requirements as per the specification.

- (iv) **Prices:-** The price should be quoted in nett per unit (after breakup) and must include all packing and delivery charges. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable. However the percentage of tax & duties should be clearly indicated.

The price should be quoted without custom duty and excise duty, since I.I.T. Madras is exempt from payment of excise duty, and the custom duty will be paid at concessional rate against duty exemption certificate.

In case of import supply, the price should be quoted on CIP or CIF basis indicating the mode of shipment.

- (v) **Agency Commission:-** Agency commission, if any, will be paid to the Indian agents in Rupees on receipt of the equipment and after satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in Tender even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent.
- (vi) **Terms of Delivery:-** The item should be supplied to our destination in case of local supply. In case of import supply, the item should be shipped only to Chennai Airport. The Installation/Commissioning should be completed as specified in our important conditions.

Yours faithfully,



N.E. Nagaraj
Special Officer (Project Purchase)
IC&SR, I.I.T. Madras.

SCHEDULE

II) Important Conditions of the tender

1. The due date for the submission of the tender is **21.04.2013, 3:30pm.**
2. The offer/bids should be submitted in two bid systems (i.e.) Technical bid and Financial bid. The technical bid should consist of all technical details along with commercial terms and conditions. Financial bid should indicate item-wise price for the items mentioned in the technical bid. The Technical bid and the Financial bid should be put in separate covers and sealed. Both the sealed covers should be put into a bigger cover. The limited tender for supply of **“ICP – RIE System”** should be written on the left side of the outer cover.
3. (i) EMD:- Two percent (2%) of the tender value quoted by the company. The EMD should be included in the Financial bid which will not be opened for Technical evaluation. **Enclosing the EMD in the Technical bid will automatically disqualify the tenderer.** EMD should be in the form of DD in favour of “The Registrar, Indian Institute of Technology Madras” and payable at Chennai. The tender without EMD would be considered as UNRESPONSIVE and REJECTED. Photo/FAX copies of the Demand Draft/Banker’s pay orders will not be accepted. The EMD will not be paid any interest and EMD shall be converted as a security deposit of the successful bidder and the same will be returned after the completion of the warranty period.

(ii) **The Successful bidder should submit Performance Security an amount of 5% of the value of the contract. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt from the commercial bank, Bank Guarantee from commercial bank will be an acceptable.**

(iii) The Performance Security should be valid for the period of 12 months from the date of Installation.

(iv) The EMD (Bid Security) will be refunded to the Successful bidder on receipt of Performance Security.

4. If an Indian agent is involved, the following documents must be enclosed:
 - i) Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
 - ii) Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
 - iii) The enlistment of the Indian agent with Director General of Supplies & Disposals under the Compulsory Registration Scheme of Ministry of Finance.
5. The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.
6. Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical bid. No prices should ever be included in the Technical bid.
7. Documentary proof for the claimed position and repetition accuracies must be obtained from the principals and submitted along with the relevant pages of the standards.
8. Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.
9. **Delivery Schedule:-** The tenderer should indicate clearly the time required for delivery of the item. In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.
10. **Risk Purchase Clause:-** In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.

11. **Payment:-** No Advance payment will be made for Indigenous purchase. However 90% Payment against Delivery and 10% after installation is agreed to wherever the installation is involved. In case of import supplies the payment will be made only through Letter of Credit and 90% payment will be released against delivery and 10% after installation wherever the installation is being done.
12. **On-site Installation:-** The equipment or machinery has to be installed or commissioned by the successful bidder within 15 to 20 days from the date of receipt of the item at Institution of IIT Madras.
13. **Warranty/Guarantee:-** The offer should clearly specify the warranty or guarantee period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately.
14. **Late offer:-** The offers received after the due date and time will not be considered.
15. **Acceptance and Rejection:-** I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.
16. **Disputes and Jurisdiction:-** Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.
17. **Acknowledgement:-** It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

**SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE
COMPANY WITH DATE.**

Annexure I

General specification for procurement of ICP RIE system:

A. Equipment Specification

1. Universal base consol housing electronic sub systems, control units, pneumatics and full magnetically levitated turbo molecular pump without separate electronics rack.
2. System should be able to handle and process up to 200mm wafers. However, suitable substrate adapters and wafer carriers to process smaller cut pieces of substrates should be provided.
3. Reaction Chamber: Machined from a solid aluminum block. Electrically heated chamber liners. A pumping port with diameter of at least 200mm. View port and end point detection ports for optical emission and laser interferometer.
4. Pressure measurement: 100 mTorr heated CM gauge (with <1mTorr offset), isolation valve and penning gauge.
5. RF generator:
Helical Coil ICP – 13.56 MHz Maximum power at least 3KW, with direct coupled automatic matching unit
6. Substrate – 13.56 MHz, Maximum power at least 300W, with directly coupled automatic matching unit. **Automated Matching Unit for every recipe step should have specific park positions, a manual match position or hold at last match position**
7. Aluminum Load-lock Chamber for wafers 2", 3", 4", 5", 6" and 8". Small volume <5litre for short pump time. Automatic loading of wafers into the chamber. Manual opening/closing of chamber lid, view port.
8. Lower electrode: Aluminum suitable for processing up to 200 mm wafers. Fluid cooled for temperature control in chiller range. Clamping by Single piece quartz clamp for each wafer size.
9. The roughing vacuum pump for main chamber and load lock chamber should be dry pumps. Process chamber dry-pump 100 cubic m/hour. Full Magnetically levitated turbo molecular pump with at **least 1300l/s** for ensuring the required process vacuum. **Turbo-pump position to be off tee below table to provide axially symmetric pumping without risk of wafer breakage falling into turbo. Pumps directly below the chamber (even with mesh) are not acceptable.**

10. Separate gas-pod to house MFCs. System capable to be fitted with max 12-lines, configured with 6 for processes required (O_2 , Cl_2 , CHF_3 , C_4F_8 , SF_6 , HBr)
11. Automation and programming features: Capability to store at least 100 process recipes on the equipment, capability to remotely **monitor the process status through network connection. Software controlled through PC and PLCs.** Operating system Windows7 for operator interface of process control, interlock against operator error, wafer handling, real time data logging of all process parameters and keyboard inputs. System must provide a user logon requirement with user programmable levels of access.
12. Helium to back of wafer for substrate heat-transfer, without seals.
13. Heater/Chiller with the range in operation of 0-80°C.
14. Electrical power : specify as per Indian standards
15. Exterior frame: Finish should be compatible with better than class 1000 clean room environment.
16. Also indicate the cost for additional 3 years AMC contract beyond the warranty period. (itemize the cost)
17. Vendor must have own development labs in which to demonstrate process performance if required.
18. During the installation a couple of agreed processes should be verified to meet the process criteria for acceptance by the customer.
19. Clearly specify site preparation requirements.

B. SPECIFIC PROCESS CAPABILITY REQUIREMENT

I. Silicon etching with the following independent specifications:

- a. With high-rates of at least 10-300 nm/min.
- b. Smooth sidewalls notching down to <10nm
- c. Lines of less than 50nm should be etched
- d. Features <500nm with aspect ratio of 10:1 should be achievable
- e. Etch uniformity across 100mm wafer and wafer to wafer should be better than +/-5%
- f. Profile control such that positive profiles may be effected

II. The system must be capable of handling following chemistry and results as given:

(i) SOI etch with Cl_2

SOI etch rate:	~ 80 nm/min
SiO_2 etch rate:	30 nm/min
Selectivity SiO_2 : PR	0.5:1

(ii) Mixed process

Recommended Etch Gases: C₄F₈ (or CHF₃), SF₆

Recommended Plasma Clean Gases: O₂

Up to 100mm wafers

Etch rate > 300 nm/min

Selectivity Si: PR > 3:1

Selectivity Si: SiO₂ > 6:1

Uniformity < +/- 5%

Reproducibility < +/- 3% (run to run)

Profile control 85 Deg to 92 Deg

Aspect Ratio up-to 10:1

(iii) HBr based process

Recommended Etch Gases: HBr, O₂

Recommended Plasma Clean Gases: O₂

Up to 100 mm wafers

Etch Depth 0.05 μm to 1 μm

Etch rate > 100 nm/min

Selectivity Si: PR > 2:1 (bulk step)

Selectivity Si: SiO₂ > 100:1 (Selective over etch)

Selectivity Si: HSQ > 50:1 (Selective over etch)

Uniformity < +/- 5%

Reproducibility < +/- 3% (run to run)

Profile control 80 Deg to 90 Deg +/- controllable

(iv) Mixed process for nanoscale features

Recommended Etch Gases: C₄F₈ (or CHF₃), SF₆

Recommended Plasma Clean Gases: O₂

Up to 100 mm wafers

Etch Depth 0.01 to > 1 μm

Etch rate 50-200 nm/min

Selectivity Si: PMMA > 1.5:1

Selectivity Si: SiO₂ > 4:1

Uniformity < +/- 5%

Reproducibility < +/- 3% (run to run)

Profile control 90 Deg +/- 1

Aspect Ratio > 5:1

Sidewall smoothness < 10nm

Feature sizes > 10 nm

(v) Other Qualification Criteria:

- a. Installation and on-site training for running the system to specifications must be provided
- b. In the offer, there must have list customers to whom same/similar items have been supplied along with at least 3 reference list (**of Indian customer**) with names, phone number and address with details.
- c. Separate quotes for additional accessories (if available) to be provided
- d. The Supplier must have an authorized Service Centre in India
- e. Name and Address of Indian Agent to take care of after sales service to be provided