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PU/PHY/NS/DST-NANO/10-11/57 Date: 20-06-2011

Sir,

Sub: Quotation for **FIVE TARGETS MAGNETRON SPUTTERING SYSTEM**- Reg

Sealed quotations are invited so as to reach the undersigned on or before **14.07.2011 Noon and will be opened on the same day at 03.00 P.M.,** as per the list enclosed below mentioned subject to the following terms and conditions.

I. Name of the equipment: **FIVE TARGETS MAGNETRON SPUTTERING SYSTEM**

Detailed specifications:
The High Vacuum Compatible Five Target Magnetron Sputtering System for depositing Metals, semiconductors, Insulators by DC and RF, for serial and co-sputtering, are suitable for Research and Development as well as small production.

Main features of the system are**:**

1) ALL PARTS SHOULD BE MADE BY **SS 304L** CONSTRUCTIONS OF VACUUM CHAMBER, VALVES AND VITON 'O' RINGS AND GASKETS

❖ **VACUUM CHAMBER:**

- Cylindrical vertical 400 mm diameter x 400 mm height
- All SS 304 L construction
- Complete DC and RF compatible structure for serial and co-sputtering
- Electro-polished from inside and glass bead blasted from outside.
- TIG welded Stainless Steel C-Channel for water cooling of chamber
- 4" window for plasma viewing
- Helium leak tested for leak rates better than

1×10^{-9} Torr lit/sec.

- HV Compatible Glass View port with RF Shield and Shutter for Plasma Viewing
- Removable Top Plate Assembly with Magnetron Mounting
- All Stainless Steel Inner Removable shields

❖ **VACUUM VALVES:**

i) **Roughing Valve:** 1 no.

- Right Angle Bellow Sealed
- ISO KF 40 Compatible
- Electro pneumatically Operated
- Microswitch for OPEN/CLOSE indication and Feedback
- Roughing Valve interlocked with Chamber Pressure

ii) **Backing Valve:** 1 no.

- Right Angle Bellow Sealed
- ISO KF 40 Compatible
- Electropneumatically Operated
- Microswitch for OPEN/CLOSE indication and Feedback

iii) **High Vacuum Valve:** 1 no.

- SS Gate type Valve
- ISO 100K Compatible
- Electropneumatically Operated
- Micro switch for OPEN/CLOSE indication and Feedback
- Interlocked with chamber Vent Valve

iv) **Throttle Valve [Butterfly type]**: 1 no.

- ISO 100 K
- Stepper Motor Control and position indicator.
- PID controller for Downstream closed loop Pressure Control in conjunction with Capacitance Gauge

v) **Chamber Vent Valve:** 1 no.

- Straight Through/Right Angle Valve
- SS Bellow Sealed
- ISO KF10 Compatible
- Electropneumatically Operated
- Micro switch for open indication and Feedback

❖ **SPARE PARTS:**

- All O' rings / gaskets and seals 1 set
- Fuses and switches 1 set
- Turbo Molecular Pump oil 1 charge

❖ **GAS FLOW MANIFOLD:**

a) Mass Flow Controllers (Make: **MKS or EQUIVALENT)**

Argon – 0 – 100 sccm	1 no.
Oxygen – 0 – 100 sccm	1 no.
Nitrogen – 0 –100 sccm	1 no.

b) Control Electronics with set point control and digital display of Flow rate in sccm

c) Gas Inlet Valve (Isolation) - 1 no.
- Right Angle 'O' ring sealed
- Electro pneumatically Operated
- ISO KF 10 compatible
- Micro switch for OPEN indication and interlock

d) Gas Mixing Chamber and all SS Tubing with Swagelock compatible fittings

2) MAGNETRON SPUTTERING CATHODE ASSEMBLIES SHOULD BE WITH RARE EARTH MAGNETS AND DC/PULSED DC/RF COMPATIBILITY

❖ **<u>MAGNETRON CATHODE ASSEMBLY</u>:**

- 2" Magnetron cathodes assembly in Sputter Down configuration 5 nos. (1 no. for metal + 1 no. for Anode + 1no. for Electrode + 1no. for Lithium based compound as an Electrolyte + 1 no. for Insulation as a protective layer)
- Suitable Geometry for sequential sputtering of five targets without breaking the vacuum
- RF / DC / Pulsed DC compatible
- Integrated gas inlet assembly to provide uniform erosion
- High Target utilization
- All Stainless Steel Integrated Shutter Assembly [Electropneumatic / motor based]
- Microswitch arrangement for Target identification for Power Supply

- Water Flow Switch Interlock for each target.
- Cross Contamination Shields to avoid deposition in between cathodes (Isolation chimney)

3) SHUTTER CONTROL ON SUBSTRATE / TARGET TO AVOID CROSS CONTAMINATION

❖ **SUBSTRATE HOLDER AND ROTATION:**

- Substrate holder assembly to accommodate 1 substrate of 1" x 1" size. To be coated in sputter down mode
- Fixture can accommodate smaller sizes of irregular shapes.
- Substrate holder isolated from ground for bias facility
- Integrated Ar gas Inlet Assembly
- Substrate rotation facility with speed 0 - 20 - 30 rpm
- Heating and Cooling cannot be done simultaneously

❖ **SUBSTRATE HEATING SYSTEM:**

- High Vacuum Compatible Quartz lamp based Substrate Heater construction
- Water cooled Gold coated SS Reflectors
- Thyristorized Heater Power Controller
- PID Controller with Digital Display of substrate temperature from 25-300°C[± 1°C]

4) CAPACITANCE GAUGE WITH DOWNSTREAM CLOSED LOOP PRESSURE CONTROL ELECTRONICS FOR PRECISE PRESSURE CONTROL DURING SPUTTERING

❖ **VACUUM GAUGES**

- Pirani Gauges 1 no.
- Cold Cathode Gauge (IKR 251 or Equivalent) 1 no.

- Gauge Controller with digital display with set point control

- Capacitance Manometer Type Gauge (0.1 m bar range) along with PID Controller for Closed Loop Pressure Control

❖ **PRESSURE CONTROL:**

Down Stream Closed Loop Pressure Control consisting of**:**

- PID Controller (soft PID in Automated Machine)
- Stepper Motor Control Electronics (with Embedded Control)
- Direct Indication of Set and Process Value

5) HIGH VACUUM COMPATIBLE QUARTZ LAMP BASED HEATERS ALONG WITH PID CONTROL AND THYRISTORIZED POWER CONTROL FOR PRECISE TEMPERATURE MEASUREMENT AND CONTROL

VACUUM PLUMBING:

- All SS Hoses and ISO standard Fittings

6) TURBO MOLECULAR PUMPING SYSTEM TO PROVIDE FAST INITIAL PUMP DOWN, CLEAN VACUUM AND GOOD THROTTLING FOR PROCESS PRESSURE CONTROL

❖ **TURBO MOLECULAR PUMP:**

- Model HiPace 400
- Pumping 350 liters/sec [Nitrogen]
- Controller along with digital display
- Splinter Shield with Inlet ISO 100K flange

7) DRY PUMP FORELINE TO PROVIDE CLEAN OIL FREE PUMP DOWN

❖ **DRY PUMP:**
- Model D3
- Direct Driven
- Pumping Speed - 510 litters/min

8) RF AND DC ALONG WITH PULSED DC POWER SUPPLIES FOR SPUTTERING BOTH METALS AND INSULATORS

❖ **<u>POWER SUPPLIES</u>:**

(1) **RF. Power Supply:**

- i) RF Generator (Make: **DRESSLER/HUTTINGER**) 1 no.
  ii) RF Power: 300 Watt
  iii) 13.56 MHz
  iv) Incident Power and Reflected Power Indication

- i) RF Matchbox† (Make : **DRESSLER/HUTTINGER** or equivalent) 1 no.
  ii) RF Power: 300W
  iii) 13.56 MHz

- 4 RF Switch with Isolated Motorized Selector and Microswitch for Target Indication

(2) **Pulsed DC Power Supply:** 1 no.

- Power 1000W
- DC or Pulsed DC Modes of Operation
- Voltage 800 V max,
- Current 3 Amp [max.]
- Frequency [0-30 KHz]
- Duty cycle counter (in pulsed mode) 10% - 90%
- Arc count and short circuit protection
- Unique Arc Suppression Circuit
- All interlocks with indication.
- Remote indication of voltage, current, frequency and duty cycle

9) DIGITAL THICKNESS MONITOR WITH CLOSED LOOP SHUTTER CONTROL THROUGH PLC

❖ **DIGITAL THICKNESS MONITOR WITH QUARTZ CRYTAL SENSOR**

- Model: SQM 160 1 no.
- Dual Sensor head SH102 1 no.
- RS 232 Interface
- Sensor SH-102 with cooling facility

10) RANGE OF INTERLOCKS FOR OPERATOR

SAFETY.

11) ALL CRITICAL ELECTRICAL COMPONENTS SHOULD BE CERTIFIED

12) MAIN FRAME should be:

- Chamber Support Frame of epoxy powder coated mild steel material
- All interlocks for safety operation
- Electrical overload protection
- Chamber closed interlock
- Compressed Air failure
- Emergency stop
- Single Phasing Preventer

13) Water Chiller (cooling system)

Flow rate: 30 liters/min
Inlet Temperature: 15 ^{0}C
Outlet Temperature: 20 ^{0}C

II. <u>TERMS AND CONDITIONS</u>

1. Last date and time of receipt of the Tenders: **14.07.2011 Noon,** as per the list enclosed below mentioned subject to the following terms and conditions.

2. Date & Time of opening of the Tender: **14.07.2011** , 3.00 PM

3. Tender Document fee Rs.250/-
4. EMD rates: 2.5% of the quoted price.

5. Two bid systems will be to be strictly followed, that is one for technical bid and another for commercial bid. They have to be submitted in two separate sealed covers.

6. The EMD should be submitted along with quotation in a sealed cover, super-scribing thereon bidder's name and name of the Item. Any tender, submitted without EMD, will not be accepted.

7. Quoting merely the lowest price does not confer any right to any bidder for award of supply order. The University's Purchase Committee, reserves the right to select any bid / equipment under the grounds of specification compliance, technologically advanced quality, proven performance track record, brand reputation, service backup support, additional warranty, offer of additional / special features, Compatibility with the existing System, Training, etc.

8. The tenders should be addressed to the Registrar, Pondicherry University.
The example for super-scribing the envelopes of the different categories of tenders are given below: -

Tender submitted for the Department of Physics Name of the Equipment: To Prof. N. Satyanarayana, Principal Investigator – DST-NANO MISSON Department of Physics, Pondicherry University, R.V. Nagar, Kalapet, Puducherry – 605 014. From Supplier's Address

9. Quoting the Core price & Tax, Duties, Discount etc.
The taxes / duties / discounts, if applicable, are to be explicitly and separately shown in the bid.

10. **Eligibility:** The firm must have the requisite domain expertise with regard to supply, installation and post-sale service of the items they are quoting.
The firm should have been in existence for at least six years as on the date of this tender and must have executed at least three orders for this kind of equipment during the last three years.

11. **Duty Exemption:** The University has been granted the benefit of exemption from the payment of the Central Excise Duty and Customs Duty by the Department of Scientific and Industrial Research (DSIR), India, vide their Notification No.10/97 dt. 01-03-1997 and 51/96 dt. 23.07.96 respectively,
in respect of
a. Scientific and technical instruments, apparatus, equipment including computers.
b. Accessories and spare parts of goods specified in (a) above and consumables.
c. Computer software, compact disks, CD ROM, Recording magnetic tapes, microfilms, micro-chips etc.
d. Prototypes.
Customs duties at Indian port, if any, will be to the account of the University.

12. **Warranty:** The material covered under the purchase order, when installed, shall be warranted for the quality, workmanship, trouble free operation and performance for a period of at least 36 months from the date of putting the system into operation at the Pondicherry University, or at least 42 months from the date of receipt of the last lot of the consignment in India. If any item covered under warranty fails, the same shall be replaced free of cost including all the applicable charges including shipping cost both ways.

13. The information pertaining to infra-structural, power and any other requirement for satisfactory installation and commissioning of the whole system must be provided by the bidder, at least 120 days in advance of the installation to be commenced if purchase order is issued. All drawing for electrical connections, electrical safety items piping work etc. must be provided in detail.

14. Complete technical specifications and literature, including process flow, to be included with the quotation. Manufacturers of various major parts/equipment must be mentioned explicitly.

15. A clear statement regarding availability of after-sales service and availability of spare-parts for next 5 to 10 years should be included.

16. A recent customer list (within last five years) with contact details including email address is to be submitted with technical bids / bids as the case may be.

17. If the bidder is an authorized representative in India, they are requested to inform their technical ability to take care of the problems in the system, if developed later within the warranty and outside the warranty period. The responsibility of the Indian agent must be clearly specified.

18. The bidder from abroad shall obtain, if required, export permission from the appropriate authorities in his country or the country of origin for items to be shipped to India in case of items to be imported. The University shall provide necessary information if required for this purpose.

19. All equipment must operate at 230V/50 Hz single phase and / or equivalent three phase electrical power.

20. The validity of the each quotation should be at least 180 days from the closing date of the bid.

21. The offers will not be considered if received after the bid closing time & date.

22. The offers received through telex / tele-fax / e-mail will not be accepted by the University under any circumstances.

23. The University shall not be responsible for any delay / loss or non-receipt of tenders by post / courier service.

24. No unsolicited correspondence shall be entertained after the submission of the offer.

25. If an order is placed with the firm, the purchase shall be governed by an agreement as per the University rules in force at the time.

26. Additional terms and conditions will be incorporated in the purchase order, if needed, to safe guard the interests of the University.

27. Tender is not transferable.

28. In case of any dispute in respect of the tender, all legal matters shall be instituted within the jurisdiction of the place where the purchaser ordinarily resides.

29. **Power to reject the offer:** Pondicherry University reserves the right to accept / reject any offer in full or in part or accept any offer other than the lowest offer without assigning any reason thereof. Any offer containing incorrect and incomplete information shall be liable for rejection.

30. No Agency commission will be paid to any authorized agent in India.

31. **Liquidated damages:** Timely supply of the ordered items, installation, commissioning (wherever is applicable) and training etc. is the essence of the contract. In case of failure to supply within the time specified in the Purchase order, a penalty/LD of 0.5% of the total value per week or a part thereof shall be levied subject to a maximum of 7.5% in respect of items which are not supplied. The decision of Pondicherry University shall be final in this regard.

32. The training should be provided by the supplying companies on the specimen and operation of the equipments for a minimum period of two weeks from the date of installation with an expert team.

33. For any clarification with respect to technical specifications, please contact the respective Department Heads as per the details given below: -

Sl. No.	**Name of the Department**	**Name of the Heads**	**Contact Numbers**
1.	Department of Physics	Prof. N. Satyanarayana	0413-2654404

34. Canvassing in any form is a disqualification.

III. <u>Specific Conditions</u>

1. **Payment of EMD:**
The Tender must be accompanied by EMD as stated above, by means of a Demand Draft, drawn in favour of **the Finance Officer, Pondicherry University, payable at Puducherry** separately. *The amount is refundable. The Small Scale units are exempted from payment of EMD provided they should enclose proof of their exemption Certificate issued by the competent authority*.

2. **Payments terms:**
Normally a letter of Credit will be opened for 90% of CIP price, on receipt of order acknowledgement. However, 100% of the LC also be considered, if the supplier provide Bank Guarantee towards performance Security for the 10 % of the total cost of the

equipment to cover the Warranty Period. Bank charges in India shall be borne by the purchaser and outside India shall be born by the contractor / supplier.

3. The offer must be in English. The rates should be indicated both in figures and words against item specified in the given table. It is preferable that the price be quoted in Rupees or in US Dollars or in major foreign currencies.

4. **The total cost should be quoted for FOB as well as CIF – Pondicherry University.**

5. However, the price quoted under FOB or should also include the following cost if they are required during the initial stage:
a) Local freight / insurance for Chennai airport to University laboratory.
b) Installation cost if any.
c) Cost of consumables which are required for the equipment for initial operation upto a reasonable time.

6. In case of the Principal supplier of foreign country unable to meet the conditions stated at para no.4, the local agent / dealer should fulfill the above said conditions in respect of Local Insurance, Freight, safety transport and installation, etc.

7. The bidder from within India shall obtain the requisite approval for Imports etc., if required.

Thanking you,

Yours faithfully

Prof. N.Satyanarayana
(Principal Investigator- DST-NANO MISSON)

Date:20-06-2011