



# Pondicherry University

## Centre for Nanoscience and Technology

### Tender Document

The Centre for Nanoscience and Technology, Pondicherry University invites sealed tenders under two-bid system for the supply and installation of the following items under DST Fast Track scheme funded by Structural Engineering and Research Board (SERB) of **Dr. K. Suresh Babu, Assistant Professor**. The technical specifications for the equipments are given below. All tenders should be sent to the address given below. The last date for the submission of tender is **14<sup>th</sup> September 2012, 03.00 PM**.

### **Name of the Equipment: Electron Beam based Coater with Complete Vacuum System**

#### **DETAILED TECHNICAL SPECIFICATIONS**

##### **1. VACUUM CHAMBER**

The chamber shall be of box type with front opening door made out of AISI- 304 non magnetic quality stainless steel having the following typical dimensions:

Nominal Internal size : ~ 400 mm (Width) x 350 mm (Depth)  
Nominal Internal height : ~ 300 mm

Suitable thickness of stainless steel plate shall be used to have a sturdy chamber structure

##### **2. BASE PLATE**

The base plate shall be made of stainless steel AISI-304 and approximate diameter shall of 325 mm suiting the above chamber dimensions. The base plate shall be finely ground and lapped and electro chemically polished to achieve the fine surface finish to seal with bottom flange of the chamber.

##### **3. TOP PLATE**

The top plate shall be made of stainless steel AISI-304 and provided with substrate holder along with necessary feedthroughs etc. at its center.

##### **4. VACUUM PUMPING SYSTEM**

###### **a. ROTARY VACUUM PUMP**

Rotary vacuum pump suitable to evacuate the chamber mentioned.

Displacement capacity : 350 lit/min (approximately)

Ultimate vacuum attainable :  $1 \times 10^{-3}$  m.bar

###### **b. OIL DIFFUSION PUMP WITH CRYO TRAP**

Oil diffusion pump with cryo trap

Displacement capacity : 750 lit/s (approximately)

Ultimate vacuum attainable :  $1 \times 10^{-6}$  m.bar

### **c. HIGH VACUUM VALVE**

High vacuum valve: ~ 150 mm butterfly valve type to facilitate isolation of the diffusion pump, even when the chamber/load is exposed to atmosphere.

### **d. PLUMBING LINES**

Roughing and backing lines shall be of 25 mm size with 25 mm combination valves.

Air admittance valve shall be provided to release vacuum in the chamber.

Needle valve fine control type (0 - 3000 cc/min.) shall be provided for controlled admittance of inert gas into the chamber for sputtering operation.

## **5. GAS FEEDING**

Manually operated fine control needle valves shall be provided to the chamber to control the vacuum level inside the chamber by purging argon gas through the needle valve during sputtering operations.

## **6. VACUUM MEASURING GAUGES**

Pirani Penning gauge with two pirani gauge heads to independently monitor the roughing (chamber) & backing pressure on the separate Pirani meters in the 100 to 0.001 m.bar range, through a selector switch.

One metal penning gauge head to monitor high vacuum on a separate penning meter in two ranges. First range  $1 \times 10^{-2}$  to  $1 \times 10^{-5}$  m.bar. Second range  $3 \times 10^{-5}$  to  $1 \times 10^{-6}$  m.bar. All the three gauge heads shall appropriately be located to read respective vacuum of roughing, backing and high vacuum.

## **7. Electron Beam Gun with Power Supply and X – Y Sweep Control**

270° bent beam type electron beam gun with 3 phase power supply (tetrode version) with turret index and scan unit.

Number of sources : 4

## **SPECIFICATIONS**

- |                                    |   |  |
|------------------------------------|---|--|
| 1. Maximum power rating            | : | 3 kW                                     |
| 2. HT Voltage                      | : | 5 kV                                     |
| 3. Filament Supply                 | : | 6 V @ 20 A                               |
| 4. Emission Current                | : | 600 mA (max)                             |
| 5. Magnet                          | : | Permanent ALNICO                         |
| 6. Beam Size                       | : | 4 mm at 1 kW                             |
| 7. Overall Dimensions (preferably) | : | 100(W) x 150 (D) x 100 (H)               |
| 8. High Voltage feedthroughs       | : | Teflon Insulated rated for 15 kV/10 amps |

### **a. Crucibles**

Different types of crucibles for using the samples shall be quoted

### **b. Crucible Rotation Control**

DC motor capable of offering different rpm for indexing mode and continuous rotation mode shall be offered.

### **c. X – Y Sweep Control Technical Data**

- |                           |   |                                 |
|---------------------------|---|---------------------------------|
| 1. Input Voltage          | : | 220 VAC ( $\pm 10\%$ )          |
| 2. Power Consumption      | : | 10 VA (approximately)           |
| 3. Max deflection current | : | 0.05 A                          |
| 4. Wave form              | : | Sine, triangular wave or square |

5. Lateral oscillation frequency : 1 to 100 Hz
6. Longitudinal oscillation frequency: 1 to 100 Hz

**d. Power Supply Module for Electron Beam facility**

1. Input Voltage : 440V, 3 phase, 50 Hz
2. Output Voltage : 4.5 to 5.5 kV dc variable
3. High Voltage Regulation : <+ or – 1%
4. Max Emission Current : 600 mA
5. Voltage Ripple Factor : 0.5 % of rms
6. Filament output : 0 to 6 V ac at 20 A

**e. Source Control Module**

1. Voltage Meter Range : 0 to 6 kV (Digital Readout)
2. Ammeter Range:
  - Emission : 0 to 600 mA (Digital Readout)
  - Filament : 0 to 2000 mA (Digital Readout)
3. Remote Control Signal : 0 to  $\pm 10$  V

**8. SUBSTRATE HOLDER CUM HEATER**

Substrate holder with heater diameter : ~ 85 mm

Maximum temperature achievable : Preferably up to 500 degrees C

Controller for heater : Variable rider controller with digital display read out

Power Supply : ~ 50 V AC and 6 Amp

Transformer : Necessary step down transformer shall be provided to meet the above power supply rating

Feedthroughs : Necessary vacuum feedthroughs shall be provided for taking the electrical leads to the heater

Facility shall also be provided to move the substrate holder manually such that the substrate will move from one position to another position for deposition purpose.

**9. FILM THICKNESS MONITOR**

To measure the real time coating thickness, a real time Quartz based film thickness shall be provided.

**10. E BEAM COATING SYSTEM SHOULD SUPPORT THERMAL EVAPORATION OR HIGH TENSION CLEANING WITH THE FOLLOWING OPTIONS:**

**L.T evaporation feedthroughs**

1 No. of LT electrical feedthrough for evaporation made of electrolytic pure copper, with 200 amps current carrying capacity shall be provided.

**H.T. ion cleaning feedthrough**

One HT electrical feed through to carry power for Ion cleaning shall be provided. The ion bombardment gadget fixed on the feedthrough shall provide a uniform glow discharge.

**Evaporation source holder**

Central evaporation source holder (1 set) shall be provided as a standard to accept Filaments / Baskets / Boats as evaporation sources.

### **Work holder**

A circular work holder made of aluminum shall be provided from top plate of the box chamber (approximately 320 mm diameter).

### **Electrical controls :**

Unit shall operate on 220V A.C 50 Hz Single phase power supply.

### **L.T. power supply**

A 200 amps power supply capable of delivering 200 amps at 10 volts, 100 amps at 20 volts intermittent and 160 amps at 10 volts, 80 amps at 20 volts continuous shall be provided.

### **H.T power supply**

A 5000 volts DC Open circuit, 3500 volts at 50 mA high reactance type transformer and solid state bridge rectifier shall be provided.

### **L.T/H.T control**

An 8 amps dimmerstat in the input circuit of LT/HT selector shall provide the output power variation.

### **Meters**

Separate digital panel meters shall be provided for LT/HT primary current and LT secondary current through current transformers.

**Thermal and E beam shall be positioned such a manner that the operation of one should not affect the components of others.**

## **11. SAFETY DEVICES**

- a. Water Flow switch in the water circulation line of the unit shall be provided to protect the Diffusion pump in case of water supply failure/pressure by switching off the diffusion pump heater.
- b. A thermostat switch shall be fitted to the water cooling coils of the diffusion pump to protect from excessive heating.
- c. Cabinet doors shall be provided with safety panel switches to cut off DC Power supply whenever the doors are open, thereby avoiding any contact of the user to high tension power lines/supplies.
- d. A vacuum switch shall be connected in the DC Power supply line so that this power supply cannot be energized without achieving vacuum in the chamber, there by avoiding switching on of HT without chamber in position/vacuum.
- e. Over load protection shall be provided for Rotary pump, motor through preset current starter.

## **12. MOUNTING**

All the above components shall be compactly and esthetically housed in a state of the Art cabinet fabricated of out angle iron structure with laminated top, with front panel for mounting gauges, valve controls, vacuum system control so that all the operations are made from the front panel itself with operational comfort. Top of the cabinet shall be kept free for use as a work table except the space occupied by the base plate, D.C. Power Supply are assembled in separate 19" rack cubical.

4 Castor wheels shall be fitted to the unit to provide mobility and make the unit manoeuvring easy. The frame shall be provided with jack bolts to keep the system in stationary position.

Rotary pump shall be mounted inside the cabinet on a suitable support provided in the cabinet. The pump shall be connected to the combination valve through a vibration damping flexible corrugated SS bellow of minimum length.

All the water connections shall be terminated at the back of the unit for the convenient connection.

The Rotary pump exhaust shall be terminated at the back of the unit so that it can be connected to a point outside the room if necessary.

### **13. GENERAL**

**a) A comprehensive quote shall be provided with respect to the cost and the components of the entire coating system.**

b) All the stainless steel components and sub-assemblies shall be electro chemically polished and tested for leak tight joints.

**c) Power Requirement**

The system should operate on AC power supply of 3 phase with the ratings of 32 A; 440 V; 50 Hz

### **14. INSTALLATION AND CUSTOMER TRAINING**

The instrument shall be installed and commissioned at our site at free of cost. Complete operation and capabilities of the equipment shall be demonstrated at site. Complete training for operating the system shall be given.

### **15. SPARES/OPTIONAL ACCESSORIES**

The list of necessary spares and their prices for three years of trouble-free operation along with all the available optional accessories shall be quoted separately including that of the special substrate heater (upto 800°C).

## **TERMS AND CONDITIONS**

### **I. General Information:**

a) Last date and time of receipt of the Quotations: September 14, 2012, 3.00 PM

b) Date and Time of Opening of the Quotations: September 14, 2012, 3.30 PM

b) Quotation / Tender Document fee Rs. 500/-

c) EMD rates: Rs. 25,000/-.

- d) Two bid systems have to be strictly followed. One for Technical bid and another for commercial bid and each bid should be submitted in separate sealed covers.
- e) However, the tender document fee and EMD as specified above should be remitted by each firm / bidder, collectively for all their bids advertised under this tender.
- f) 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 the equipment any bid under the grounds of specification compliance, technologically advanced quality, proven performance track record, brand reputation, service backup support & training, offer of additional / special features, compatibility with the existing System, etc.
- g) The Tender Document Fee and EMD should be submitted in a separate cover superscribing **Bank Demand Draft** and **which should be enclosed with the technical bid. Tenders received without the appropriate fees will not be entertained.**
- h). The Photo Copies of the Bank Instruments on payment of EMD should be attached with each bidding covers.
- i) The tender / quotation must be submitted along with the stipulated tender document fee and EMD in the sealed cover, super-scribing the name of the Department / Centre for whose equipments the tender is quoted for.
- j) The cover should also contain the information like, Name of the Equipment and Serial Number of Equipments for which the bids are submitted. The name and address of the bidder should also be mentioned at the from address space.
- k). The tenders should be addressed to ***Dr. K. Suresh Babu, Principal Investigator and Assistant Professor, Centre for Nanoscience and Technology, Pondicherry University, Puducherry – 605 014.***

The examples for super-scribing the envelopes of the different categories of tenders are given below: -

Tender Submitted under Double bid system for the Centre for Nano Science & Technology

Name of the Equipment: Electron Beam based Coater with Complete Vacuum System

To  
**Dr. K. Suresh Babu,  
Principal Investigator and Assistant Professor,  
Centre for Nanoscience and Technology,  
Pondicherry University,  
Puducherry – 605 014.**

From  
Supplier's Address

In case of local delivery, all tenders are to be dropped in the tender box placed at the Information Facilitation Counter, Bharat Ratna Dr. B. R. Ambedkar Administrative Block, Pondicherry University, R.V. Nagar, Kalapet, Puducherry – 605 014.

1) Quotations will not be accepted through fax / e-mail.

## **II. Common Conditions (Import or Indigenous)**

### **1. Purchase of Quotation Document:**

The Quotation / Tender document can be downloaded from the University website [www.pondiuni.edu.in](http://www.pondiuni.edu.in) or procured from the Pondicherry University on payment of fee as specified above, by means of a D.D, drawn in favor of **The Finance Officer, Pondicherry University, payable at Puducherry**. The downloaded application should be accompanied with the quotation document fee, in the form of a Demand Draft.

### **2. Price Schedule**

The rates should be quoted for a single unit and also for the total quantity required by the University. The price should include the delivery, installation, training charges, etc. at the respective Department, Pondicherry University. The prices quoted shall remain firm until the equipment is supplied to the respective Department, Pondicherry University.

### **3. Quoting the Core price & Tax, Duties, Discount etc.**

The taxes / duties / discounts, if applicable, are to be explicitly and separately shown in the bid.

### **4. 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 quotation and must have executed at least three orders for this kind of equipment during the last three years.

### **5. 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 dated 23.07.96 respectively, in respect of

- a) Scientific and technical instruments, apparatus, equipment, Software 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, microchips etc.
- d) Prototypes.

Customs duties at Indian port, if any, will be to the account of the University.

### **6. WARRANTY:**

- i). The equipments 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 Centre for Nanoscience and Technology, Pondicherry University, or at least 42 months from the date of receipt of the last lot of the consignment in India.
- ii) 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. 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.

- iii) Complete technical specifications to be included in the Technical bid. Complete technical specifications and literature, including process flow, to be included with the quotation. Manufacturers of various major parts/equipment must be mentioned explicitly.
- iv) The necessary service support should be provided by Bidder during the agreement period.
- v) The training should be provided by the supplying companies for a minimum period of two days from the date of installation with an expert team.
- vi) Technical post sale support by email and telephone will be provided during the period.
- vii) Detailed service and operating manuals in English with necessary electronic circuitry shall be provided along with the system.
- viii) A clear statement regarding availability of after-sales service and availability of spare-parts for next 5 to 10 years should be included.
- ix) 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.
- x) If the equipment is proprietary a product, a proprietary product certificate should be enclosed.
- xi) The information pertaining to infrastructural, power and any other requirement for satisfactory installation and commissioning of the whole system must be provided by the bidder, at least 30 days in advance of the installation to be commenced if purchase order is issued.
- xii) The equipment must operate at 230V / 50 Hz single phase and / or equivalent three phase electrical power.
- xiii) 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.
- xiv) 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.
- xv) **The validity of the each quotation should be at least for SIX MONTHS from closing date.**
- xvi) The offers will not be considered if received after the bid closing date and time.
- xvii) The offers received through telex / telefax / e-mail will not be accepted by the University under any circumstances.



- xviii) The University shall not be responsible for any delay / loss or non-receipt of quotations by post / courier service.
- xix) No unsolicited correspondence shall be entertained after the submission of the offer.
- xx) 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.
- xxi) Additional terms and conditions will be incorporated in the purchase order, if needed, to safe guard the interests of the University.
- xxii) Quotation is not transferable.
- xxiii) In case of any dispute in respect of the quotation, all legal matters shall be instituted within the jurisdiction of the place where the purchaser ordinarily resides.

**7. Power to reject the offer:**

- i) 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.
- ii) No Agency commission will be paid to any authorized agent in India.
- iii) 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.
- iv) Bidder(s) must be authorized business partners of Global / National service providers of the respective equipment.
- v) The Bidders must enclose authorization letter from the respective global / national service providers of the above equipments particularly mentioning an undertaking that in case of default by the Bidder, they (Global Service Provider) shall take over all the responsibilities of the Bidder.
- vi) The Bidder should not be involved in any Bankruptcy filing for protection from it.
- vii) 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.
- viii) 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/Centre	Name of the PI	Contact Details
01.	Centre for Nanoscience and Technology	Dr K. Suresh Babu	0413-2654976 klsureshbabu@yahoo.com

### III. Specific Conditions for Imported Equipments

#### 1. *Payment of EMD:*

The Quotation must be accompanied by EMD as stated above, by means of a Demand Draft, drawn in favor of ***The Finance Officer, Pondicherry University, payable at Puducherry.*** *The Small Scale units are exempted from payment of EMD provided they enclose the proof of their exemption Certificate issued by the competent authority.*

#### 2. *Payments terms:*

- i) 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.
- ii) Bank charges in India shall be borne by the purchaser and outside India shall be borne by the contractor / supplier.
- iii) 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.
- iv) The total cost should be quoted for FOB as well as CIF – Pondicherry University.
- v) 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.
- vi) 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.
- vii) The bidder from within India shall obtain the requisite approval for Imports etc., if required.

**REGISTRAR**

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