# S. N. Bose National Centre for Basic Sciences

## Block JD, Sector III, Salt Lake, Kolkata – 700098

**(An autonomous national centre funded by the Department of Science & Technology, Government of India)**

Tender No.SNB/PUR/OT/17 Date: 09/02/2012

### OPEN TENDER

Sealed tender in two parts (separate technical and price bids) are invited in the name of the Director, S.N. Bose National Centre for Basic Sciences from reputed equipment vendors for the following items. The detailed technical specifications and terms & conditions can be obtained from the website: http://www.bose.res.in.

The sealed quotation must reach this office within 30 days from the date of publication of this advertisement.

| *Sl.No.* | *Name of Item* |
|---|---|
| 1. | Optical Telescope for Study of Expo-planet search using transit detection technique |
| 2. | Astronomical CCD Camera back illuminated |
| 3. | Research type smart and computer controlled UHV deposition unit with e-gun and resistive heating elements |
| 4. | Research type ICP-RIE Unit for metals, dielectrics and semiconductors |
| 5. | Microfocused Brillouin Light Scattering Setup |
| 6. | Pulse Generator with accessories |
| 7. | Table Top Spin Coater |
| 8. | Gases |
| 9. | LAN Networking |
| 10. | Computer Desktop |
| 11. | Computer Server |
| | |

Registrar

**TENDER PUBLISHED IN THE FOLLOWING NEWSPAPERS ON 9TH FEBRUARY,2012 (THURSDAY) :**

**TIMES OF INDIA :**

**Kolkata,New Delhi,Mumbai,Chennai,Bangalore,Hyderabad & Pune editions.**

**LAST DATE OF SUBMISSION OF TENDER : 9TH MARCH,2012 (FRIDAY)**

# S. N. Bose National Centre for Basic Sciences

## Block JD, Sector III, Salt Lake, Kolkata – 700098

**(An autonomous national centre funded by the Department of Science & Technology, Government of India)**

## NOTICE INVITING TENDER

Tender No.SNB/PUR/OT/17 Date: 09/02/2012

Sealed tenders are invited for the equipment as per the details enclosed from the reputed, established and competent manufacturers / suppliers in two bids – technical and financial. The details of tender documents are as follows:-

| | | |
|---|---|---|
| 1. | *Name of office inviting tender* | S.N. Bose National Centre for Basic Sciences<br>Block JD, Sector III, Salt Lake, Kolkata – 700098 |
| 2. | *Name of equipments* | Mentioned in Annexure – I |
| 3. | *Specifications of the equipments* | Can be obtained / downloaded from our website address: www.bose.res.in |
| 4. | *Separate bid for Part-A: Technical and Part-B: Commercial* | One large envelope having two smaller envelopes containing separately – Part-A: Technical bid and Part-B: Commercial bid need to be submitted. Two smaller envelopes should be superscribed Technical bid / Commercial bid as the case may be. |
| 5. | *Submission of Tender* | The tender documents duly filled in arranged and sealed in aforesaid manner should be sent to: The Director, at the address given under Sl.No.1 above so as to reach him within 30 days of date of publication of advertisement. The envelope should be superscribed "Tender for Item ……. Against Advt…… dtd……." The commercial bid of only technical qualified tenders will be opened. |
| 6. | *Opening of Commercial bid* | The Commercial bid will be opened in the presence of Tenderers / their representatives. The tenderer who will qualify for above will be notified in due course after technical selection. |
| 7. | *Documents to be attached along with the tender* | A list showing names and address of the National Research Institutes / Universities / Centre of Higher Learning around the world to whom similar equipments have been sold mentioning Model number and year of manufacture / supply, including those sold in India. |

This office will not be responsible for postal or any other delay and the **Authority of the Office reserves the right to accept or reject any or all tenders without assigning any reason**. Tenders / offers sent by fax / email will not be entertained and would be rejected.

DIRECTOR
S.N. BOSE NATIONAL CENTRE FOR BASIC SCIENCES

Annexure – I

| *Sl.No.* | *Name of Item* |
|---|---|
| 1. | Optical Telescope for Study of Expo-planet search using transit detection technique |
| 2. | Astronomical CCD Camera back illuminated |
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| 6. | Pulse Generator with accessories |
| 7. | Table Top Spin Coater |
| 8. | Gases |
| 9. | LAN Networking |
| 10. | Computer Desktop |
| 11. | Computer Server |
| | |

**General Terms & Conditions:**

1) The bid should be submitted in two bid system each of which is to be submitted in separate envelope. One envelope should contain "techno commercial bid" i,e,(technical specifications, terms and condition, terms of payment but not price) and other envelope should contain price bid. Both the envelopes should be kept in a another envelope which should be marked with tender reference number, name of the equipment and date of opening of tender.
2) The tenderer should be high technical & financial reputation and should have sufficient experience in supply, installation & commissioning of similar type of equipment to actual users.
3) The tenderer should have requisite facilities for manufacturing/ testing and shop inspection as per National/International standards.
4) Against such offers, if statutory requirement demands clearance from concerned Governments the tenderers should confirm in their offer that "Export License" in that respect would be arranged by them at their cost.
5) Offers should be complete in all respect indicating therein the unit price(s) including manuals, make, model, duties and taxes, date of delivery, gross and net weight of the consignment, terms of payment (Irrevocable letter of credit only)together with the descriptive leaflet/catalogue/pamphlet.
6) The offers shall remain valid at least for a period of **90 days. The period starts from the date of closing of tender submission.**
7) The Institute shall not be responsible for delay, loss or non-receipt of the tender through post.
8) The aforesaid Open Tender is being issued with no financial commitment and purchaser reserves the right to change / vary any items or items thereof at any stage.
9) No tenderer shall be entitled for any compensation what so ever for rejection/non consideration of his tender.

10) Invitation of tender does not constitute any right or claim for issue of purchase order to the tenderer .
11) Only Price Bids will be opened in presence of the bidders or their authorized representative who choose to attend on the date and time informed to them after opening of technical bids and its evaluation.
12) The Centre will not be responsible for any misprinting by the news papers concerned and inaccessibility of the downloading facility for any reason whatsoever and in that case the tenderer(s) should contact to the tendering authority to verify the fact in case of confusion.
13) If any information furnished by the tenderer is found incorrect or false at a later stage he shall be liable to be debarred from ordering / tendering
14) For items originating from abroad 80% payment shall be made by letter of credit and the balance 20% payment will be released after successful completion of installation.

**TECHNICAL SPECIFICATION FOR OPTICAL TELESCOPE FOR STUDY OF EXPO-PLANET SEARCH USING TRANSIT DETECTION TECHNIQUE**

S. N. Bose National Centre for Basic Sciences is planning to install small sized telescopes for Astronomical Research and Development project. Major science aim for such facility is to do a cutting-stage scientific program in observational Astronomy - **"searching for extra-solar planets using transit technique".** The observing facility will also be used to study Gravitational micro-lensing, GRB afterglows, Novae and Supernovae etc. The Centre is establishing an Astronomical Observatory with small-class telescopes of aperture size 0.5 -0.6 meter at hilly region in West Bengal in the first phase, and later a moderate sized telescope of aperture size 1.5 - 2 meter for follow-up transit candidates at better resolution, and other science programs (e.g. GRBs afterglow, Supernova and Novae monitor, variable stars etc.).

Quotation for a complete optical telescope system are invited from the well reputed vendors to supply a **robotic optical telescope** for the above mentioned science programs. The technical details follow later in this document.

- Detailed quotation together with profile of the company including its past experience in the optical design and fabrication of astronomical professional telescopes may be send to **The Director, S. N. Bose National Centre for Basic Sciences, JD Block, Sector-III, Salt Lake, Kolkata-70098, India**

- The technical bid should include details of the technical specifications for the complete telescope system, which includes Optical tube assembly, mount and necessary accessories for wide-angle CCD imaging. The technical bid should include the compliance table for the asked technical specifications in the section-2.1. The technical bid should be sealed in a separate envelope.

- The commercial bid should contain a detailed cost of the complete telescope system, which should be a firm upper limit. The commercial bid should be sealed in a separate envelope.

- Both the sealed envelopes containing technical and commercial bid should be packed in one envelope and should be sent to the Director, SNBNCBS

## 2. Specification of requirements

**We request quotation for the complete robotic compatible telescope system with electronic units and control software according to the technical specifications and environmental conditions mentioned in the section 2.1**. The vendors are requested to quote for different aperture-sized telescopes as a complete individual set, which will include technical and commercial bid.

## 2.1 Technical Specifications for the Telescope - Optical Tube Assembly and Mount

| i. Optical Tube Assembly of the Telescope | |
|---|---|
| Telescope primary mirror size (clear aperture) | 0.5 - 0.6 meter |
| Telescope type | Cassegrain or Ritchey-Chretein (R-C) |
| Effective F-ratio number | 4 - 7 |
| Unvignetted field of view(FOV) at the focal plane | > 90 mm in diameter. The proper baffling on mirrors will be preferred to reduce the sky brightness level. |
| Operating wavelength | 350 - 2500 nm |
| Optical quality | 80% Encircled Energy (EE80) within 0.6 - 0.8 arcsecond over entire field of view |
| Focus | Cassegrain |
| Back focus from the instrument mounting flange | > 250 mm |
| Mirror material | Zeurodur or Astro-sitall or equivalent low-expansion material with aluminum coating and protective over-coating, and reflectivity > 92 %. The primary mirror cleaning procedures must also be discussed by the vendor. |
| Primary mirror cover | Robotic primary mirror cover for dust protection |
| Optical design file of the telescope | Optical design file in Zemax or optical prescription data is required for instrument design and procurement. |
| **ii. Telescope's Mount** | |
| Mount type | Equatorial Fork mount / Alt-Azimuth (including de-rotator in the case of Alt-Azimuth mount) |
| RA and DEC Motor drive | Should be zero backlash and zero periodic error with high resolution encoders (< 0.05 arcsecond or better to achieve the tracking accuracies). |
| Tracking accuracy | < 1 arcsecond peak to peak in 20 minutes<br>< 0.2 arcsecond RMS for 30 minutes in open loop and closed loop.<br>< 0.2 arcsecond RMS for 180 minutes in closed loop with auto-guider<br>Parameters are required to be demonstrated during |

| | |
|---|---|
| | factory test and installation. |
| Pointing accuracy | less than 10 arcsecond in blind pointing and < 3 arcsecond RMS with pointing model using the standard star catalogs. |
| Elevation range for celestial objects | 10 - 90 degree or 10-87 deg for Alt-Az |
| Telescope moving | Slew/set/guiding rate in altitude and azimuth<br>Slew : 6 -8 deg/sec<br>Set : 2 - 1 arcmin/sec<br>Guide : 1 - 0.1 arcsecond/sec |
| Tracking | Sideral rate<br>Non-sideral/Custom rate with > 5 arcsec/sec for comets and Asteroids observations. |
| Auto-guider unit | should be included with capability of 15 Vmag with exposure of 1-2 seconds. The unit could be either off-axis field with atleast 15 arcminute FOV or on-axis using less than 15% of main telescope beam with exposure of 1-2 seconds to achieve the depth mentioned above. |
| Motorized Auto-focus unit and Camera adaptor | should be included. Precision secondary mirror focuser will be preferred with the focal plane travel of +/- 50 mm. Camera adapter should be included in the bid for handling the 4K back-illuminated CCD camera with coolant system. |
| Instrument weight (payload) capacity | The main instrument will be a modern CCD imaging camera with cryo-cooling system. As a baseline we therefore require about 60 kg payload at a suitable centre of gravity from the mounting flange that could be adjusted by the counter weights. |
| Telescopes control system | User friendly fully automated computer control in all sub-systems are required. Robotic mode compatible telescope control software, which include pointing model, and ability to control dome and CCD or can communicate with other software (dome or CCD) through Internet network (TCP/IP) or RS 232 port. The fully documented software are required. The software includes moderate sized sky-catalog for the graphical pointing. |
| Enclosure of the telescope | The vendor might suggest S N Bose Centre about enclosure system of the telescope considering successful running the system in robotic mode for remote operation. The vendor might propose for a turn- |

| | |
|---|---|
| | key project including telescope system, enclosure system and robotic operation with a indicative price other than the telescope system separately and that will be considered also in the selection of the vendor during the technical bid. |
| **iii. Environmental conditions of the site** | |
| Site location for the telescope | Long : 86.7 deg E; Latitude : 23.6 deg N; Altitude: 600 meter from MSL |
| Operating temperature | 5 - 40 deg C |
| Non-operating Survial temperature | 5 - 48 deg C |
| Relative humidity | 20 - 99.5 % |
| Wind | < 3 m/s |
| Peak Gust | < 15 m/s |
| Temperature variation during the night | 15 deg C |
| **iv. Telescope installation at the site** | |
| Installation | **Complete installation and demonstrated at the site by the vendor. The vendor should demonstrate the tracking and pointing performance of the telescope at the site according to their specifications.** The vendor will train the user staffs with complete documentation. |

# 3. Term and conditions

## 3.1 Installation and testing at site

The vendor should arrange to install the complete telescope at the site at their own cost. Please mention that what kind of help are required during the installation processes. After demonstration of testing, the delivery date will be approved and take effect.

## 3.2 Compliance matrices of the technical specifications

Kindly include a compliance matrices of the above mentioned specifications (in section 2.1)

## 3.3 Delivery time and payment schedule

Please mention the delivery time and payment schedule after receiving the purchase order.

## 3.4 Documentation

Full documentation of the telescope including all electronic units should be included. The documentation on the software and source code should be included.

**3.5 Guarantee and service**

The term and scope of guarantees must be indicated. Minimum 1 year fully guarantee on whole system and software should be included, meaning that the vendor will pay all costs of corrective measure with minimum time. The guarantee date shall take effect from the approved delivery date after complete installation at the site and testing. Please specify also all options and prices for longer duration guarantee period.

**3.6 Technical ability and capacity**

Please enclose details of previous few relevant projects handled by the vendor.

**3.7 Packaging and Insurance**

The vendor should assure about the proper packaging and insurance cover for shipping the materials.

**3.8 Prices**

The vendor should offer the prices based on CIF value for import by Air freight or Sea-freight for posting up to S N Bose Centre, Kolkata, West Bengal, India. The firm prices will be preferred.

**3.9 Other terms and conditions**

In addition to those above mentioned terms and conditions, please follow the general terms and conditions mentioned in the tender document.

**3.10 Contact person**

Any questions regarding the technical specifications, terms and condition may be sent by email, phone or fax to.

**Dr. Soumen Mondal**
email : soumen.mondal@bose.res.in; skmondal@gmail.com
Phone : +91-33-2335-5706 / 5707 / 5708 Ext 378 ; Mob +918017577649
Fax: +91-33-23353477

**TECHNICAL SPECIFICATIONS FOR ASTRONOMICAL CCD CAMERA BACK ILLUMINATED**

S. N. Bose National Centre for Basic Sciences is planning to install small sized telescopes for Astronomical Research and Development project. Major science aim for such facility is to do a cutting-stage scientific program in observational Astronomy - **"searching for extra-solar planets using transit technique".** The observing facility will also be used to study micro-lensing, GRB afterglows, Novae and Supernovae etc. The Centre is establishing an Astronomical Observatory with small-class telescopes of aperture size 0.5 or 0.6 meter at hilly region in West Bengal in the first phase. **A back-illuminated 4K X 4K CCD imaging camera will be first-light instrument at the focal plane of the telescope.**

Quotation are invited to supply a **complete Astronomical 4K X 4K back-illuminated CCD imaging camera** from the well reputed vendors for the above mentioned science programs. The technical details follow later in this document.

- Detailed quotation together with profile of the company including its past experience in may be send to **The Director, S. N. Bose National Centre for Basic Sciences, JD Block, Sector-III, Salt Lake, Kolkata-70098, India**

- The technical bid should include a details of the technical specifications for the complete telescope system, which includes Optical tube assembly, mount and necessary accessories for wide-angle CCD imaging. The technical bid should include the compliance table for the asked technical specifications in the section-2.1. The technical bid should be sealed in a separate envelope.

- The commercial bid should contain a detailed cost of the complete CCD camera system, which should be a firm upper limit. The commercial bid should be sealed in a separate envelope.

- Both the sealed envelopes containing technical and commercial bid should be packed in one envelope and should be sent to the Director, SNBNCBS

## 2. Specification of requirements

We request quotations to supply **a scientific grade 4K X 4K Astronomical CCD camera along with control electronics, mechanical shutter assembly and data acquisition software** according to the technical specifications in the section 2.1.

## 2.1 Technical Specifications for CCD camera

| | |
|---|---|
| CCD Camera system | A scientific grade Astronomical back-illuminated 4K X 4K CCD chip with the cooling system and control electronics and data acquisition software |
| CCD array size | 4096 X 4096 pixels in a single chip |
| CCD type | Back-illuminated, monochrome |

| | |
|---|---|
| Detector chip | Scientific grade ( 0 or 1) |
| Pixel size | 12-15 micron |
| Quantum efficiency | > 50% @350 nm, >95% @peak, >40% @900 nm |
| Readout noise | 3- 5 electrons per pixel @ 1 MHz readout |
| Dark current | > 3 electron/pix/hr at -100 deg C |
| Full well capacity per pixel | > 150000 electrons |
| Non-Linearity | < 1% |
| Cooling system | A suitable cooling mechanism capable to cool the CCD detector to a temperature at - 100 degree C. In case cryo-cooling system, the vibration should be in negligible range. |
| Anti-reflection coating | Astro Broad-band to minimize the ghost |
| Operating Environment | 10 -40 deg C, Relative humidity 20-99% |
| PC Interface | Optical Fibre or USB 2.0 with Cable length of more than 30 meter or TCP/IP client compatible for remote operation |
| Readout Mode | Readout frequency upto 10 MHz, custom sub-array sampling of the CCD array , multiple binning options (e.g. 2X2, 3X3, 4X4 and custom) multi-port readout options with close to zero-cross talk |
| Digital Resolution | 16 bit with variable gain |
| Mechanical Shutter | 65 mm or more (without any vignetting) a Mechanical shutter with minimum shutter opening time of order of few tens of millisecond with uniform illumination on the chip. We would prefer Bonn shutter. |
| Camera software | Linux and Windows compatibility Camera software is used to control the camera electronics and acquire the data. Imaging data from CCD should be in standard FITS image. |

## 3. Term and conditions

### 3.1 Prices

The vendor should offer the prices based on CIF value for import by Air freight or Sea-freight for posting upto S N Bose Centre, Kolkata, West Bengal, India. The firm quote prices will be preferred.

### 3.2 Terms of Payment

The terms of payment are by bank letter of credit (LC) normally 80% of the payment will made though LC. The rest 20% will be paid after successful camera testing at the SNBNCBS, Kolkata.

**3.3 Compliance matrices of the technical specifications**

Kindly include a compliance matrices of the above mentioned specifications (in section 2.1)

**3.4 Delivery time and payment schedule**

Please mention the delivery time and payment schedule after receiving the purchase order.

**3.5 Documentation**

Full documentation of the Camera including all control electronics system should be included. The documentation on the software and source code should be included.

**3.6 Guarantee and service**

The term and scope of guarantees must be indicated. Minimum 1 year fully guarantee on whole system and software should be included, meaning that the vendor will pay all costs of corrective measure with minimum time. The guarantee date shall take effect from the approved delivery date after complete installation and testing at our Laboratory.

**3.7 Technical ability and capacity**

Please enclose details of previous few relevant projects handled by the vendor.

**3.8 Packaging and Insurance**

The vendor should assure the SNBNCBS about the proper packaging and insurance cover for shipping the materials.

**3.9 Other terms and conditions**

In addition to those above mentioned terms and conditions, please follow the general terms and conditions mentioned in the tender document.

**3.10 Contact person**

Any questions regarding the technical specifications, terms and condition may be sent by email, phone or fax to.

**Dr. Soumen Mondal**
email : soumen.mondal@bose.res.in; skmondal@gmail.com
Phone : +91-33-2335-5706 / 5707 / 5708 Ext 378 ; Mob +918017577649
Fax: +91-33-23353477

# Research type smart and computer controlled UHV deposition unit with e-gun and resistive heating elements:

**Note:**

1.The vendor is needed to submit the technical specification addressing each of the points. Absence of any comments on any of the specification will be taken as a non-compliance.

2. Technical bids which are of general nature and do not address the specifications point wise will be rejected.

**General:**

1. The vendor should follow internal trade norms and practices and should not have monopoly trade restrictions.
2. Supplier should provide installation and on-site training. They should have arrangements to have occasional schools using application specialists.
3. Warranty should be for minimum of one year from date of installation and cost for extended warranty (if any) and AMC upto 5 years should be quoted in the price bid.
4. Availability of local support as demonstrated by availability of customer support service, engineering support for on-site maintenance and repairs.
5. Vendors need to provide as a part of technical bid a list of trained personal (with degrees and level of training) who will be available for after-sales services.
6. Single technical person vendors will not be considered.
7. Vendors should provide a list of similar/compatible installations in India if any. Preference will be given to vendors who have a proven record of successful installation and service in India.
8. All technical queries should be addressed to the Purchase I/C of the centre.

**A. Materials capability:**

The system should be able to deposit high quality materials like metals and semiconductor films with uniform coverage upto a 5 cm (or more) area on wafers under UHV condition. The technical bid should accompany technical notes or technical literature of materials deposited using like a published paper.

**B. Deposition chamber and vacuum system:**

1. Deposition Chamber - 304L Stainless Steel with Chamber Mounting Hardware and Quick Entry Door with dimension 30 cm or more. Chamber should be compatible with bake out.
2. Turbo molecular Pump based system with a guaranteed base pressure of $< 5 \times 10^{-8}$ Torr and capability to reach lower than $10^{-9}$ Torr . Suggested speed for Turbo pump should be around 300l/sec or more and should be from reputed manufacturer like Pfiffer/Alcatel. Vacuum specification is a major compliance. Vendors whose vacuum chamber does not meet this criterion need not apply.
3. Inert gas vent and purge arrangement.
4.Compatible gauges of sufficient number for proper vacuum diagonistics.
5. Extra port with dummy for attaching Mass spectrometer; leak detector and RGS like SRS RGA 100 or 5keV.

6. Port with 6 low current feed- throughs (vacuum and baking compatible) for in-situ electrical measurements.
7. Port facing substrate so that a 5keV ion gun can be installed for substrate cleaning.
8. Port arrangement for gas supply if needed.
9. Gate valve to isolate pump from chamber

**C. Single Sample Load Lock.**

1. With Entry Door
2. Manual Gate Valve to PVD Chamber for isolation.
3. Pumping for the Load Lock with capability of teaching a pressure with a base pressure of $5 \times 10^{-8}$ Torr or better.
4. Magnetic Transfer Rod capable of transferring sample from load lock to the Main Chamber.

**D. Evaporation source**

**e-beam source**

- Minimum 4 pocket with minimum size 2cc with rugged e-beam beam bending /focusing arrangement.
- Power supply for above with minimum 3kW rating.
- Shutters.
- Test report on stability of source should be supplied.

**Thermal Cell**

- Minimum 3 boats.
- Power Supply compatible with boats with stated high current capabilities and power rating.
- Shutters

Specification of evaporation source is a major compliance.

**E. Substrate stage**

- Substrate stage size not less than 2".
- Heating arrangement to 700C or more and power supply for substrate heater.
- Deposition monitor based on Quartz Crystal balance.
- Arrangement for holding substrate.
- Adjustable sample and source distance.

Specifications of substrate stage is a major compliance.

**The unit should be compact and plug and use type, self-sufficient without need for any extra arrangements from user.**

**D. Mains supply specifications:**

The system should have compact power-supply distribution box for different parts of the system with electrical interface between evaporator and user power supply. Compatible with Standard single phase -220V 50 Hz or Standard 3 –phase 380V, 415 V, 50Hz power supply.

**Optional -. Controls systems:**

Compact control system operable through PC units and with manual over ride.

**F. General:**

1. User training and after sales services will be a major compliance.

Demonstration of systems capability at manufacturer site before shipping should be arranged.

**TECHNICAL SPECIFICATIONS FOR RESEARCH TYPE ICP-RIE UNIT FOR METALS, DIELECTRICS AND SEMICONDUCTORS**

**Note:**

1.The vendor is needed to submit the technical specification addressing each of the points. Absence of any comments on any of the specification will be taken as a non-compliance.

2. Technical bids which are of general nature and do not address the specifications point wise will be rejected.

**General:**

9. The vendor should follow internal trade norms and practices and should not have monopoly trade restrictions.
10. Supplier should provide installation and on-site training. They should have arrangements to have occasional schools using application specialists.
11. Warranty should be for minimum of one year from date of installation and cost for extended warranty (if any) and AMC upto 5 years should be quoted in the price bid.
12. Availability of local support as demonstrated by availability of customer support service, engineering support for on-site maintenance and repairs.
13. Vendors need to provide as a part of technical bid a list of trained personal (with degrees and level of training) who will be available for after-sales services.
14. Single technical person vendors will not be considered.
15. Vendors should provide a list of similar/compatible installations in India if any. Preference will be given to vendors who have a proven record of successful installation and service in India.
16. All technical queries should be addressed to the Purchase I/C of the centre.

**A. Chamber and vacuum specifications:**

1. Main chamber (Aluminium) with viewport with plasma shield – preferably machined from a monoblock to provide highest vacuum integrity. The chamber should be useable with corrosive gases like $Cl_2$ and $NH_3$. Back view port for installation of Optical emission spectroscopy system in future.
2. Vacuum system -anticorrosive Turbo-Molecular Pump with compatible backing pump (with Fomblin oil and exhaust side filter) and compatible gauges (including Baratron gauge) with high conductance connection to main chamber with gate valve. Base pressure should be equal to or better than $10^{-6}$ mbar, arrangement for inert gas purge.
3. Load lock system ($10^{-6}$ mbar) with wafer transfer and compatible gate valve.
4. The complete unit should be compact and should not have a premium on clean room space. Foot print and added space requirement will be an item for consideration.

**B. Substrate / wafer specifications:**

1. Capable of handling minimum 4” wafers (manual handling).
2. Helium back side cooling.
3. Dynamic temperature control with necessary heating and cooling arrangements and necessary heaters/chillers/circulators. Preferable temperature range of operation— $-25^0$C to $+250^0$C.
4. Provision for manually adjustable distance to plasma source desirable.

**C. Plasma source specifications:**

1. Inductively coupled plasma (ICP) source with necessary cooling arrangements. Pressure range of operation 0.2 Pa to 10 Pa.
2. Power range variable from down to 10 W upto to at least 1kW or more with achievable plasma density more than $10^{11}/cm^3$ or better with minimum ion energy of 10eV as certified by a test report.
3. Highly stable and uniform (tolerance ±5%) plasma over wafer area.
4. Integrated automatic matching network.
5. Necessary RF source (13.56 MHz) for ICP with switched power supply, necessary cooling arrangements (air cooled preferred) with matching network and power 1KW or more.
6. RF biasing for substrate (13.56 MHz, 600W) with cooling and automatic matching network.
7. A diagnostic report on the plasma achieved in the model proposed need be supplied with the technical bid.

**C. Etch gas supply specifications:**

1. Gas supply box placed close to plasma.
2. Gas lines with Mass Flow controllers, by pass for corrosive gas and cut-off valves.
3. Etch gases to be used initially- $Cl_2$, $NH_3$, $CF_4$, $CHF_3$, $C_4F_8$, $SF_6$, Ar, $O_2$.
4. Provision for future expansion to 4 more lines will be preferred.
5. Materials to be etched include : Si, $SiO_2$, $SiN_x$, Al, Ti, Au , $SrTiO_3$, PZT

**D. Mains supply specifications:**

The system should have compact power-supply distribution box for different parts of the system with electrical interface between ICP etcher and user power supply. Compatible with Standard 3 –phase 380V, 415 V, 50Hz power supply.

**E. Controls systems:**

Compact control system operable through PC units with all operating systems , systems monitors and parameter displays, Recipes and recipe editors, Automatic and manual control, Password protected system access.

**F. General:**

2. User training and after sales services will be a major compliance.
3. Demonstration of systems capability at manufacturer site before shipping should be arranged.
4. Price bid should quote one year of spare supply for maintenance.
5. The technical bid may include relevant technical notes as well as published papers based on this machine for etching the materials stated in item C.

**TECHNICAL SPECIFICATIONS FOR COMPONENTS FOR MICROFOCUSED BRILLOUIN LIGHT SCATTERING SETUP**

**The setup consists of the following components:**

**a) Tandem Fabry-Perot Interferometer with Confocal Microscope**

- **Tandem Fabry-Perot Interferometer with automatic synchronisation and ultra linear scan, motor control of spacing and mirror alignment, excluding mirrors. Includes lens set for adjustment of mirror spacing.**
- **Control Unit to scan and stabilise the Interferometer including segmented ramp facility.**
- **Optical System comprising all components from input pinhole to output pinhole (except Interferometer mirrors) to allow easy pre alignment and operation as 3-pass tandem spectrometer.**
- **Light Modulator LM2 - a double shutter system for regulation of the elastic peak intensity. For use with the above Control Unit.**
- **2 pairs of mirrors coated to user specification. Flatness after coating guaranteed better than lambda/200.**
- **Dynamic vibration isolation system for the interferometer complete with power supply**
- **Enclosure to house complete spectrometer.**
- **Perkin Elmer photon counter for maximum 2cts/sec dark count at room temperature.**
- **Pinhole viewer for alignment of external optics.**
- **MCA *Ghost* multichannel scaler. Built in control unit.**
- **Confocal microscope.**

**b) Single mode CW DPSS Laser compatible with the interferometer setup as above**

**Wavelength: 532 nm**

**Output power: 300 mW or more**

**Spectral Linewidth: <10 MHz (<0.01 pm)**

**Spatial Mode: TEM00**

**Longitudinal Mode: Single**

**Frequency Drift: <50 MHz/°C**

**Beam Quality: $M^2$ <1.1**

**Beam Diameter ($1/e^2$): 0.7 ±0.1 mm (collimated)**

**Beam divergence: <1.2 mrad (collimated)**

**Beam Ellipticity: 1 ± 0.1 (collimated)**

**Beam Pointing Stability: < 6 µrad/°C**

**Noise: < 0.2% rms (20 Hz–20 MHz)**
**Power Stability (over 8 hours): <±1%**

**Polarization Ratio: >100:1**

**Warm-up Time: <5 min**

**Operating Voltage: 12V DC**

**Maximum Power Consumption: < 60 W**

**Operating Temperature: 10–40°C (<90% relative humidity)**

**Maximum Laser Head Base Plate Temperature: 50°C**

**Vibration: 3 G (15–500 Hz); Shock Tolerance: 25 G or more**

**Static alignment tolerances relative to adjustment holes:**

**Beam Position: ±0.1 mm; Beam Angle: ± 0.5 mrad**

# TECHNICAL SPECIFICATIONS FOR PULSE GENERATOR AND ACCESSORIES

***Output pulse parameters***

**Amplitude into 50 Ω: 10 V, max ± 0.2 V; 900 µV min adjustable at 1 dB steps**

**Polarity: Positive only**

**Baseline: 0 V**

**Risetime (10% - 90%): 55 ps typical, 65 ps max.**

**Falltime (90% - 10%): 115 ps typical**

**Duration (50%): 100 ps (nominal) to 10 ns, adjustable in 2.5 ps steps**

**Baseline Precursor < 1 %**

**Topline Overshoot < 4%**

**Topline Perturbations < ±3% for t < 2 ns**

**Topline Flatness < ±0.5%, for 2 ns < t < 10 ns**

**Source Impedance 50 Ω, nominal**

**Reflection Coefficient ±5% during pulse, +80%; -40% after pulse**

**Trigger and Timing**

**Trigger Output Pulse 2.4 V into 50 Ω, 50 ns**

**Delay [2] 0 to 63 ns, 1 ns (nom) steps**

**Delay Jitter: 1.5 ps rms typical; 3 ps rms max.**

**Period 10 µs to 1 sec, 0.1 µs steps**

**Repetition Rate 1 Hz to 100 kHz**

**Trigger Mode Int., ext., manual or GPIB**

**Ext. Trigger Input Level: -2 V to +2 V, positive or negative slope**

**Max. Ext. Trigger Input ± 5 V**

**Ext. Trigger Impedance 50 Ω**

**Ext. Trigger Jitter 5 ps rms typ. (< 1 ns rise)**

**Ext. Gate Input TTL, > 2 V on, < 0.5 V off; Ext. Gate Impedance 50 Ω**

***GPIB Capabilities***

**Standard IEEE 488.1**

**Programmable Parameters: Voltage Amplitude, max limits on/off**

**Time: Duration, delay, period and frequency**

**Trigger Source: Int, ext, manual and GPIB**

**Trigger: Level, slope, hysteresis and gate**

*General Specs*

**Connectors: SMA for 10 V pulse output, BNC for trig in, gate in and trig out**

**Power Supply (mains) 100, 115 or 230 V AC, ± 10%; switch selectable, 50 or 60 Hz**

**Operating Environment: Indoors, 0 C to 50 C, < 80%rh.**

**Calibration: Calibration report with waveforms furnished, NPL/NIST-traceable, valid at +23 C ± 3 C and 100 kHz rep. rate**

***Attenuator* 40 GHz, 6 dB, 2.92mm connector J-P**

***Kelvin Bias Tee* 40 GHz, 2.92mm, J-J-SP**

***Semi-rigid coax cable* with SMA connector.**

## TECHNICAL SPECIFICATION OF SPIN COATER

- Table Top system
- Sample size varying from 5 mm to 100 mm.
- Max. Spinning speed: at least 8000 r.p.m.
- Spinning speed resolution within ± 5 r.p.m. for all sample sizes
- Spinning Acceleration: around 3000 r.p.m./sec
- No wobbling during spinning
- Spinning time: 1 to 1000 sec.
- Programme and store atleast 50 recipe

It Should have

- Polypropylene process bowl
- Waste bottle
- Vacuum Pump
- Vacuum Chunks for wafer pieces < 1 inch
- Digital vacuum gauge
- Safety interlock for vacuum to prevent spinning if no vacuum in the chunk.

List of users using this system for Lithography

Service person in the Eastern India

# List of Gases

**Gases:**

- Carbon Monoxide ($^{12}C^{16}0$ )
- Carbon-di-Oxide ($^{12}C^{16}0_2$ )
- Carbon Monoxide ($^{13}C^{16}0$ )
- Carbon-di-Oxide ($^{13}C^{16}0_2$)
- Oxygen ($^{16}0_2$)
- Oxygen ($^{18}0_2$)
- Nitrogen ($^{15}N_2$ )
- Ammonia ($^{15}NH_3$)
- Methanol ($^{12}CH_3{}^{16}0H$)
- Methane ($^{13}CH_4$)

Specifications:

1. All the gases should be better than 99.9% pure
2. Gases should be supplied in lecture bottles (separate quote may be given for different bottle dimensions)
3. All the fittings should be compatible to ultra high Vacuum standards. Mention the Leak tightness along with the quotation.
4. Purity certificate should be provided during supply.

Other optional Items to be quoted along with the gases:

1. A Carbon Monoxide detector.
2. A lecture bottle holder (up to three bottles).

# TECHNICAL SPECIFICATION OF LAN WORK

| | | | | |
|---|---|---|---|---|
| **Sl. No** | **Details of items with all specification** | **Make** | **Part Number** | **Qty** |
| 1 | **Rack** | | | |
| | 42U Floor Standing Network Rack with Accessories | | | 1.00 |
| 2 | **Network Active Components** | | | |
| | Catalyst 3750 48 10/100/1000T + 4 SFP + IP B Image | Cisco | WS-C3750G-48TS-S | 1.00 |
| | SMARTnet 8x5xNBD (SNT) | Cisco | CON-SNT-3750G48T | 1.00 |
| | Catalyst 2960 48 10/100/1000, 4 T/SFP LAN Base Image | Cisco | WS-C2960G-48TC-L | 5.00 |
| | SMARTnet 8x5xNBD (SNT) | Cisco | CON-SNT-3750G48T | 5.00 |
| | Cisco 5508 Series Wireless Controller for up to 12 Aps | Cisco | AIR-CT5508-12-K9 | 1.00 |
| | SMARTnet 8x5xNBD (SNT) | Cisco | CON-SNT-CT0812 | 1.00 |
| | 802.11g/n Fixed Unified AP; Int Ant; A Reg Domain | Cisco | AIR-LAP1041N-A-K9 | 3.00 |
| | SMARTnet 8x5xNBD (SNT) | Cisco | CON-SNT-L1041A | 3.00 |
| | Installation Charges for the above active components | | | 1.00 |
| 3 | **Network Passive Components** | | | |
| | CAT 6A Jack Panel (48 KeyStone/Port per panel) | Molex/D-link/Nordex/Systimax | 760102251 | 12.00 |
| | UTP Cable Cat 6A (305mtr Box) | Molex/D-link/Nordex/Systimax | 760107078 | 31.00 |
| | Back Box | Molex/D-link/Nordex/Systimax | N/A | 120.00 |
| | Dual Port Face Plate | Molex/D-link/Nordex/Systimax | 760003038 | 120.00 |
| | CAT 6A Information Outlet | Molex/D-link/Nordex/Systimax | 760092411 | 240.00 |
| | CAT 6A UTP Patch Cord 3Ft | Molex/D-link/Nordex/Systimax | CPCSSX2-03F003 | 260.00 |
| | CAT 6A UTP Patch Cord 7ft (Single Side Lock) | Molex/D-link/Nordex/Systimax | | 260.00 |
| | FO Patch Cord | Molex/D-link/Nordex/Systimax | | 2.00 |
| 4 | **Network Cable Laying Charge** | | | |
| | Cable laying with ISI marked PVC/Casing charge including Rack dressing with cable organiser | | | 240.00 |
| | Charges to obtain Test Reports and Systimax Certification ( ISO/IEC IS 11801 or TIA/EIA 568-B standard) | Molex/D-link/Nordex/Systimax | | 240.00 |

A.1. Qualification of the bidder:

(a) The Tenderer must be a company registered under the Indian Companies Act, 1956.

(b) The Tenderer should have a minimum turnover of Rs. 200 Lakhs in each of the last two years. Relevant proof in the form of audited annual accounts duly certified by Chartered Accountant should be submitted.

(c) The Tenderer should be in the business of supply, installation & commissioning of LANs for atleast three years. The Tenderer should have proven experience of successfully completing at least two projects with total value of each project being at least Rs 30 lakhs during last two financial years preferably in Kolkata, India. Out of these two projects, one

project should have been done with similar components quoted in the offer. Proof of satisfactory completion along with scope of these works to be submitted with the bid.

(d) Current authorization certificate should be submitted from CISCO.

**A.2.Earnest Money Deposit**

(a) Earnest Money is to be deposited in the form of Crossed Demand Draft of any nationalized bank in India drawn in favour of "S.N. Bose National Centre for Basic Sciences", payable at Kolkata for Rs.1 lac. Any other mode of payment will not be accepted.

(b) Earnest money deposit of unsuccessful bidder will be refunded without any interest after opening of the Commercial Bids and Earnest money deposit of the successful bidder will be refunded however, without any interest after successful installation and commissioning of the equipment. The validity of the earnest money deposit should remain 180 days from the date of submission of the tender.

A.3.The technical bids will be opened by S.N. Bose National Centre, Kolkata internally and only technically qualified vendors will be called for price bid opening. The date, time and venue for opening Price bids will be intimated separately to those successful technical bidders. The decision of the technical committee will be final and binding on the tenderers.

A.4. Bid Validity: 90 days from the last date of submission of Bids.

A.5. Period for completion of work
It has been targeted that the work of LAN installation covering supply, installation, Testing and commissioning should be completed within four weeks from the placement of Purchase Order.

A.6. BID by a corporation/company must be signed in the legal name of the corporation/company, by the President/Director or by the Secretary or other person authorized to bid on behalf of such corporation/company with common seal of the corporation/company.

A.7. Bid without EMD will not be considered and shall be rejected.

A.8. Payment terms: After satisfactory completion of the work.

A.9. Terms of delivery: At buyer's site.

A.10.The bidder shall quote the prices in Indian Rupees only covering the total scope of work including supply, installation, testing and commissioning.

A.11. Firm Prices
Prices quoted must be firm and final and shall remain constant throughout the period of the contract and shall not be subject to any upward modifications, whatsoever.

A.12.Delays by the contractor
An unexcused delay by the Contractor in the performance of its Contract obligations shall render the Contractor liable to any or all of the following sanctions:

(i) forfeiture of its EMD/performance security;
(ii) imposition of Liquidated Damages
(iii) termination of the Contract for default.

A.13. Liquidated Damages
If the Tenderer fails to complete the project within the time period specified in the contract, the purchaser shall without prejudice to its other remedies under the contract, deduct from the contract price, as liquidated damages, a sum equivalent to the 5% per week (seven days) or part there of the contract price of unperformed services for each week(seven days) or part thereof of delay subject to maximum deduction of 10% of the contract price. Once the maximum is reached, the purchaser may consider termination of the contract pursuant.

A14. Warranty: 3 years comprehensive onsite warranty should be provided by the vendor from the date of installation & commissioning. 25 years materials and applications warranty certificate should be provided by the respective OEM.

## TECHNICAL SPECIFICATION OF COMPUTER DESKTOP

| | |
|---|---|
| Processor | i5-2310 (6M cache, 4 Cores, 4 Threads, 2.90 GHz 32nm) |
| Chipset | Intel® P67 Express chipset |
| RAM | 4 GB DDR3 DDR3 1333MHz MAX 32 GB |
| Storage Controller (s) | 4x SATA (3 Gbps) Ports |
| Drives | 1 x 500 GB SATA HDD |
| Optical Drive | DVD RW |
| NIC | Dual Realtek RTL8111E GbE LAN ports |
| Graphics | Nvidia 8400 GS supporting dual monitor display; |
| Exp. Slots | 1 (x16) PCI-E 2.0 (x8 if slot 4 is used),1 (x8) PCI-E 2.0 (in x16), 3 (x1) PCI-E 2.0, and 2 32-bit PCI slots |
| Ports | 6x USB 2.0 ports , 2x RJ45 LAN ports,2 x PS/2, 1 Video. |
| Keyboard | USB Keyboard |
| Mouse | Optical Mouse |
| Monitor | 18.5”TFT |
| **OS** | **SHOULD SUPPORT LATEST FLAVOURS AND VERSIONS OF LINUX Operating System like “Redhat”, “Fedora”, “CentOS” “SuSe”, “Ubuntu” etc. (BOTH 32 & 64 BIT)** |
| Chassis | Tower with 500W High-efficiency Power Supply |
| Installation, configuration, support | Bidder has to do the hardware and OS installation including network configuration and give after sales support. |
| Warranty | 3-3-3 (Three Years on-site comprehensive) from the date of installation |
| No. of items required | 80 nos. |
| Preferred Brands | Dell / HP / Lenovo |
| Payment | 100% after satisfactory installation & commissioning |

Current Authorization certificate from OEM should be submitted in the Technical Bid.
The company should have an authorized service centre in Kolkata.

**Earnest Money Deposit**

a. Earnest Money is to be deposited in the form of Crossed Demand Draft of any nationalized bank in India drawn in favour of “S.N. Bose National Centre for Basic Sciences”, payable at Kolkata for Rs.1 lac. Any other mode of payment will not be accepted.

b. Earnest money deposit of unsuccessful bidder will be refunded without any interest after opening of the Commercial Bids and Earnest money deposit of the successful bidder will be refunded however, without any interest after successful installation and commissioning of the equipment. The validity of the earnest money deposit should remain 180 days from the date of submission of the tender.

## TECHNICAL SPECIFICATION OF COMPUTER SERVER

| | |
|---|---|
| Processor | 1 x E5620 (12M cache, 4 Cores, 8 Threads, 2.40 GHz (80W) 5.86 GT/sec Intel® QPI 32nm) (DUAL CPU Capable) |
| Chipset | Intel® 5520 (Tylersburg) Chipset |
| RAM | 24 GB DDR3 1333, ECC Reg |
| Storage Controller (s) | LSI 6Gbps SAS 2108 w/ Hardware RAID support,RAID 0, 1, 5, 6, 10, support, BBU (battery backup) extension kit (optional),Onboard 512MB cache |
| Drives | 6 x 1000 GB Enterprise. SATA 7.2K RPM HDD |
| NIC | Intel® 82576 Dual-Port Gigabit Ethernet Controller Supports 10BASE-T, 100BASE-TX, and 1000BASE-T, RJ45 output Intel® support for fast, scaleable, and reliable networking Realtek RTL8201N PHY (dedicated IPMI) |
| Management | Support for Intelligent Platform Management Interface v.2.0 IPMI 2.0 with virtual media over LAN and KVM-over-LAN |
| Graphics | Integrated Graphics Card |
| Exp. Slots | Right Slot (Low-Profile - 5.5" depth): 1 (x4) PCI-E 2.0 (in x8 slot) |
| Ports | 2 x Gigabyte NIC, 1 x Video, 1 x Management, 2 x PS2, 5 USB, 1 Fast UART 16550 serial port 1 Fast UART 16550 serial header (Option) |
| Chassis | 2U Rack-mountable High-efficiency Platinum Level **Redundant Power Supply** |
| Warranty | 3-3-3 (Three Years on-site comprehensive) from the date of installation |
| No. of items required | 09 Nos. |
| Payment | 100% after satisfactory installation & commissioning. |

Current Authorization certificate from OEM should be submitted in the Technical Bid.
The company should have an authorized service centre in Kolkata.

**Earnest Money Deposit**

a) Earnest Money is to be deposited in the form of Crossed Demand Draft of any nationalized bank in India drawn in favour of "S.N. Bose National Centre for Basic Sciences", payable at Kolkata for Rs.1 lac. Any other mode of payment will not be accepted.

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