National Centre for Nanoscience & Nanotechnology
(NCNNUM)

University of Mumbai

National Center for Nanoscience and Nanotechnology, Ramkrishna Bajaj Sanskrut Bhavan,
University of Mumbai, Vidyanagari, Santacruz (E), Mumbai 400 098, India.
Tel: (022) 2654 3495, Fax (022) 26530299 Email: director@nano.mu.ac.in

Tender Document for

High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments

No: NCNNUM/Tender/205 A/2012

Date: 10th August 2012

Part A - Terms and Conditions

Part B – Specifications

Price: Rs. 500/- (non refundable)

Important Dates:

Last date of Sale of Tender Document	30th August , 4.00 pm
Last Date of Receiving sealed Bids/Tenders:	31st August, 2012, 1.00 pm
Tender opening (if minimum three bids is received)	31st August, 2012, 3.00 pm

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No: NCNNUM/Tender/205 A/2012

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Part A - Terms and Conditions

Tender Notice

National Center for Nanoscience and Nanotechnology,
University of Mumbai, Vidyanagari, Santacruz (E),
Mumbai 400 098, India
Tel: (022) 2654 3495, Fax (022) 26530299
NCNNUM/205 A/ of 2012
Date: 10th August 2012

Sealed Tender bids for the purchase of **High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments,** for National Center for Nanoscience and Nanotechnology, University of Mumbai are invited for and on behalf of University of Mumbai by the Director, NCNNUM. Following schedule shall be maintained for various processes.

Last date of Sale of Tender Document	30th August , 4.00 pm
Last Date of Receiving sealed Bids/Tenders:	31st August, 2012, 1.00 pm
Tender opening (if minimum three bids is received)	31st August, 2012, 3.00 pm

Tender Document containing terms and conditions and technical specifications are available in the Office of the National Center for Nanoscience and Nanotechnology, University of Mumbai, Vidyanagari, Santacruz (E), Mumbai 400 098, on all working days between 11.00 a.m. & 4.00 p.m. from 10th August 2012 to till 4 pm of 30th August 2012. Terms & conditions and technical specifications can also be downloaded. In case, the tender document is downloaded from the website, the Tender Document fee of Rs. 500/- should be enclosed in the Technical Bid Envelop, in the form of a Demand Draft drawn in favour of **"Finance and Accounts officer, University of Mumbai". (Kindly write your company name, instrument name and tender reference number on back of Demand Draft for Tender Fee.)** The tender bids duly complete in all respects, along with the necessary documents should be submitted to The Director, National Center for Nanoscience and Nanotechnology, University of Mumbai.

The technical bids so received, shall be opened on 31st August 2012, at 3 pm in the office of The Director, National Center for Nanoscience and Nanotechnology, University of Mumbai in the presence of the representatives of the suppliers. The Financial bids of the tenderers shall be opened on the same day or on the following day. The names of shortlisted tenderers shall be announced on the website after scrutinizing the Technical bids and evaluating their suitability to meet the University requirements. Right to reject any or all tenders, without assigning any reason thereof is reserved by the University of Mumbai.

Sd/-
Director,
NCNNUM,
University of Mumbai

Terms and Conditions of Supply

1. The last date and time for the acceptance of the bids is **31st August 2012, 1.00 pm**
2. Suppliers shall submit the following documents along with their quotations **(which should be placed in the Technical Bid Envelope, i.e Envelope No. 1)**.
   (a) Income-Tax clearance certificate from the Income-Tax Officer concerned, certifying that the tenderer has cleared all the Income-Tax dues. Copies of Income Tax returns shall be applicable.
   (b) Suppliers should be either manufacturer or authorized dealer of the said equipment and should submit the proof for the same. Also, the suppliers should state whether they are a Proprietary Firm, Partnership Firm or a Private/Public Limited Company and furnish the proof of the same.
   (c) The names of the organizations and laboratories for which similar work carried out.
   (d) Earnest Money Deposit in the form of a Demand Draft drawn in favor of **"Finance and Accounts officer, University of Mumbai"** on any Nationalized Bank, payable at Mumbai. Alternately, BG from a Nationalized Bank only may be acceptable. The amount of Earnest Money Deposit shall be Rs. 50,000/- (Rs Fifty Thousand rupees only). **Kindly write your company name, instrument name and tender reference number on back of Demand Draft for EMD.**
   (e) In case, the tender document is downloaded from the website, the Tender Document fee of Rs. 500/- should be enclosed in the form of a Demand Draft drawn in favour of **"Finance and Accounts officer, University of Mumbai"**
   (f) VAT Registration No.
   (g) Technical specifications offered by the Supplier.
   (h) Technical compliance table
   (i) Proprietary certificate, if any, should be included in the Technical bid

3. The rates should be mentioned in the **Schedule** attached with the Tender Document. Each page of the tender shall be signed in full and stamped with the seal by the supplier. The supplier must clearly state in what capacity he or she is signing the tender. **(which should be placed in the Financial Bid Envelope, i.e Envelope No. 2)**

4. The supplier shall submit the tender in two envelopes. The first envelope (Technical Bid) shall contain all the documents referred to in **para two above** and sealed. The second envelope (Commercial Bid) shall contain the **Schedule,** in which the supplier shall register the rates of supply. The second envelope shall also, likewise, be sealed. Both the envelope then should be put together, and shall be sealed in an envelope, and shall prescribe time and date. The Technical Bid shall be opened first to ensure that supplier have submitted all the requisite documents. If the Technical Bids are not in order or are deficient in some respect, the commercial bids in respect of such tenders shall not be opened. The date and time of opening the Financial bids shall be announced immediately after opening all the

Technical bids.

5. Tender bids not accompanied by the requisite amount of Earnest Money Deposit are liable to be rejected

6. The Earnest Money Deposit paid by the supplier shall be forfeited, if the supplier fails to pay the necessary security deposit in the event of his tender being accepted.

7. The amount of Security Deposit/Performance Guarantee shall be 5 % of the cost. In case of successful tenderer the amount of Earnest Money Deposit shall be converted in Security Deposit / Performance Guarantee. Security Deposit / Performance Guarantee shall be refunded after the warranty period is over. The Security Deposit / Performance Guarantee can be paid in the form of a Bank Guarantee from a scheduled bank will be deducted from the payments being made to the supplier against every bill.

8. Supplier should read carefully all the instructions and terms and conditions, etc before registering rates in prescribed schedule of the tender. Taxes and duties etc, should be shown separately.

9. The offers made by the suppliers shall be open for acceptance within 120 days after the last date of submission of tender.

10. **The Technical Documents shall be opened** by The Director, National Center for Nanoscience and Nanotechnology, **at 3.00 p.m. on 31st August 2012**, for those bids for which minimum three Vendors have participated. The tenderers or their authorized representatives shall be allowed to be present at the time of opening of the tenders. Financial bids of only qualified tenderers shall be opened. The date and time of opening the financial bids shall be announced immediately after opening all the Technical bids.

11. In case of imported items/equipments, the rates should be quoted in the light of exemptions enjoyed by educational institutions. University is exempted from the payment of Octroi and the necessary certificate/form can be issued by the University. The customs duty applicable to the University of Mumbai is maximum 5% of the invoice.

12. Technical specifications of the instruments / equipments / articles are given in Annexure to these papers (Part B).

13. The delivery, installation of the works should be completed within 4 months from date of design review and acceptance placing of the order. No extension shall be granted to the contractors/suppliers for the period of delivery, under any circumstances. All drawings to be approved by NCNNUM. No change is allowed without written permission.

14. In case of delayed supplies / installation of the equipments at NCNNUM, liquidated damages at the rate of 1 percent per week of delay with a maximum of 5 percent will be levied.

15. If the supplier fails to deliver the article as per the delivery schedule, the University of Mumbai shall be free to procure the balance/undelivered supply, at the risk and cost of the supplier, from other such suppliers

16. The goods, articles, materials supplied by the supplier shall be accepted after inspection by an officer authorized by the competent authority. No articles/materials which do not conform to the specifications laid down in the terms and conditions or damaged in transit accepted

17. Before tendering, the tenderer shall inspect the site to fully acquaint himself with the condition in regard to accessibility of site, working condition of site and locality including unloading of materials, installation of tools and plants, etc., required for the satisfactory execution of the work contract. No separate claim whatsoever on these accounts shall be entertained by the University of Mumbai. No claim for expenses incurred in the site visit will be entertained by the University of Mumbai

18. The bills of suppliers shall be paid by the University only after the complete installation of system as per the stated specification in the tender documents and certified test reports are submitted

19. Only those contractors who can execute the complete project including all the optional accessories shall submit their bids. Bids received for part work shall not be considered. Tenderers of the **High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments** should provide the entire equipments as described in part B, and will be responsible for the design, development and installation of the complete instrument.

20. Missing of any required or any of the optional accessories / features / modules of the system will disqualify the vendor from technical bid and commercial bid.

21. Furniture required should be supplied along with the equipment. It should be from Quality Laboratory Furniture Manufacturer.

22. The vendor must assume responsibility for any damage to equipment during the shipping process or unloading to NCNNUM

23. Vendor must submit Compliance statement in tabular form comparing each specification of the quoted item with that given in the Tender Document part B. The Vendor also must supply a soft copy of the Table only in Microsoft word format.

24. If the equipment is imported and requires PC, printer other peripherals, they can be bought from India and should be of International brand such as HP. The monitor should be LCD/TFT screen. The printer should be LaserJet printer. The processor should be Intel latest processor. The amount quoted for the items bought in India, installation; servicing etc. can be in Indian Rupees and the imported items can be quoted in foreign currency.

25. The warranty period shall be of 2 year from the date of complete and satisfactory installation of the system.

26. As the suppliers shall be responsible for the supply and installation of equipment at Mumbai, the cost towards insurance until destination in the University, shall be borne by suppliers.

27. The vendor has to provide clear compliance statement with respect to the specifications given in the tender document and fully supported by the manufacturer's original literature and part numbers. Any other claims will not be accepted and may lead to the rejection of the bid. It is mandatory to specify the part numbers of the quoted items along with the technical offer without which the subject offer would be liable for rejection.

28. In the event of any breach of the terms and conditions of the supply, the University of Mumbai may terminate the contract placed with the supplier and forfeit the security deposit or the supplier.

29. Right to reject any or all tenders without assigning any reason there for is reserved by the University of Mumbai

Prequalification Criteria

A. Qualification Criteria for the System Vendor.

1. The vendor must be a well established company with a large market share in the field of High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments. The vendor must have a long track record of at least 10 years (preferably 15 years) in development of X-Ray Diffraction (XRD) System with Thin Film & Texture Analysis

2. They vendor must have an Indian agent who will assist in the procurement process as well as provide after-sales service

3. The vendor must have XRD applications lab with High resolution XRD system – lab scientists available for consultation on XRD – Thin film – Texture Analysis.

4. Technical compliance statement (Annexure 'A') with original XRD manufacturer's seal and stamp in original must be enclosed

B. Qualification Criteria for the Product Brand (XRD system).

a) The brand of High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments (Make) being quoted must have a record of being in use for at least 10 years in well known production or research establishments. The vendor must provide references to that effect. Documents citing technological / research breakthroughs achieved by users of the brand will be given weight during the selection process.

b) The XRD system should be robust and contain adequate mechanisms to withstand short disruptions of the facilities (power, water, chiller, etc) without catastrophic failure

c) **Installation in India:** List of Indian users for the quoted model and certificates of successful completion issued by the clients along with their complete contact details during the last 5 years must be enclosed.

d) **Service facility in India:** The suppliers should clearly mention about their service facilities in India for prompt service support along with number of service engineers specially trained on the offered system. Down-time call attendance should be within 24 hours.

Schedule to Tender

Note:

1. Tenderers are advised to read carefully the Terms and Conditions of supply and "the Instructions to the Tenderers" before recording the rates in this schedule.
2. No erasures or overwriting shall be allowed, unless they are authenticated under the full signature and the seal of the tenderer.
3. The Rates shall be FOR, at destinations/godowns/places indicated in the delivery

Item no	Description of goods with details of specifications	Number / quantity	Price / Rate per Unit	Taxes	Duties	etc

Signature of the Tenderer

Date:

Seal of the Firm

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Tender Document for

High Resolution X-RAY Diffraction (XRD) System with Thin Film Analysis Attachments

No: NCNNUM/Tender/205 A/2012

Date: 10th August 2012

Part B – Specifications

Specifications for High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments

1. System Description

1.1 Supply, installation and performance demonstration of floor mounted, fully automated High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments with necessary hardware and software at National Centre for Nanoscience & Nanotechnology, University of Mumbai.

1.2 The thrust area using this system will be to analyze thin film epitaxy, polycrystalline materials, oxide materials and silicon epitaxy with or without in-situ doping. The hardware and software of the proposed system to support various applications / analysis, including phase identification, quantitative analysis, percent crystallinity, FWHM, crystallite size determination, orientation, texture analysis, lattice strain, unit cell refinement, indexing, Bravais lattice symmetry, space group determination, residual strain (macro-strain), etc.

1.3 The vendor must provide detailed specifications of the infrastructural requirements for the High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments with the bid. Also the tender should provide the clear timeline by which the system will be built, inspected, shipped and installed. The complete system should work at 50Hz, 200 – 240 V single phase / 440 V three phase.

1.4 System should be capable to characterize in following modes / modules

1. XRD in $\theta - \theta$ and 2θ mode. The changeover must be fully user friendly and software controlled without any manual realignment.
2. Grazing Incidence Diffraction (GIXRD) Setup / mode for thin film measurement with software
3. Pole figure attachment for texture studies
4. Rocking Curve Measurements

2. X-ray Generator

Output power : $\geq$ 3.0 kW

Voltage : $\geq$ 60kV should be possible to set in increments of 1 kV

Anode Current : $\geq$ 60 mA should be possible to set in increments of 1mA

Stability	:	Less than or equal to 0.005% for high voltage and current
Control	:	Fully controlled through Windows based PC software. User could able to set the voltage and current using the software loaded on the PC.
Safety	:	Abnormal cooling water flow, pressure and temperature detection, abnormal generator overload detection, leak current breaker, shutter malfunction detection. Options of X-ray power manual and auto start-up/shutdown

3. X-Ray Tube

3.1 Cu anode having ≥ 60 kV and ≥ 60 mA or better rotating anode

3.2 Long fine focus X-Ray tube. Option for the changeover from long fine focus to point focus and vise versa must be completed without any realignment.

3.3 X-Ray tube should have glass / ceramic insulation and evaporation resistant cathode.

3.4 It should have necessary Ni-K beta / curved crystal monochromator filter for Cu radiation for Fluorescence minimization.

3.5 Facility should be available for changing different tubes.

3.6 X-ray tube should be either manufactured by the XRD supplier or a reputed manufacturer

3.7 The system should also able to work with other X-ray sources like Mo, Co, Fe, Cr or W and prices should be quoted separately for these sources.

3.8 It should be computer controlled tube and shielded with shutter.

3.9 It should have automatic protection for voltage fluctuations and high voltage.

3.10 The quotation should contain all authentic documents and technical details from the original manufacturer on the quoted X-ray tube(s).

4. Goniometer

4.1 High resolution automated stepper motor controlled Goniometer, Vendor should specify the part no. of the goniometer

4.2 Goniometer should be of vertical type theta-theta (θ – θ) geometry based on optical position sensing system with independent theta & 2 theta (2θ) drive based on DC motors.

4.3 There should be no need for alignment when mounting and demounting of other accessories like High Temperature Attachment or Capillary Sample Stage, Detectors, Monochromators etc.,

4.4 Optical encoders or direct optical or high precision encoders with synchronous system.

4.5 Sample stage in horizontal position

4.6 Goniometer diameter should be flexible and should be able to take intermediate settings in between 400 to 550 mm. Vertical goniometer with variable measuring Circle Diameter for high intensity and better resolution based XRD application.

4.7 The configuration should permit the on site replacement of the attachments like variable temperature hot stage, grazing incidence sample stage, etc.

4.8 The goniometer should have further the following features.

4.8.1 Scanning range : 2θ from -12^{o} to 160^{0} or better ; θ from -6^{o} to 130^{o} or better

4.8.2 Scan speed : 0.001 deg/sec to 0.8 deg/sec

4.8.3 Slew speed : 15^{o}/sec or better

4.8.4 Minimum Step Size : 0.0001^{o} or lower

4.8.5 Angular reproducibility (2θ) : 0.0002^{o} or better

4.8.6 Theta (θ) / 2θ accuracy : ± 0.0025^{o} or better

4.8.7 Goniometer accuracy : : 0.0001^{o} or better

4.8.8 Linearity: ≤ 0.01^{o} for 2θ using standard sample (eg. LaB_6)

5. Optics / Slits

5.1 X-ray diffractometer should be based on three dimensional pre-aligned optics where different optical components such as slit assemblies, counter monochromator to eliminate Kβ & fluorescent x-rays for Cu target, sample stages, etc, for different application should be easily exchangeable.

5.2 Optics should include primary beta filters, divergence slits, receiving slits and anti-scatter slits. All necessary slits, filters and optics systems to be included in the basic system for the applications stated in section 1.

5.3 Divergence Slit: Computer controlled, automatic variable divergence slit.

5.4 Receiving Slit: Computer controlled, automatic receiving slit

5.5 Automatic alignment: Automatic slit exchanger system with automatic alignment and control with automatic systematic error corrections

5.6 Optics should be capable of operating with Bragg-Berntano geometry and parallel beam geometry.

5.7 Necessary optics / slits needs to be provided for thin film analysis, non-ambient temperature conditions.

6. Sample Stage and Sample Holders

6.1 Rotational Sample Stage: Rotating sample stage with facility to control the rotation speed through software. Variable rotation speed from 0 to 60 rpm. Operation modes: Continuous speed rotation, oscillation sample in plane rotation scan, continuous step and minimum step width: 0.1 degree.

6.2 Auto Sampler: Automatic sample changer for more than or equal to 5 samples has to be offered.

6.3 The sample stage for mounting flat powder samples should be provided.

6.4 Minimum 10 Nos. of sample holders for powders to be offered. Low background sample holder also to be offered.

7. Detector

7.1 Solid State Detector or Scintillation NaI detector capable of working with samples which yield Fluorescence.

7.2 Necessary attachment must be offered in the basic system for working with samples containing Fe and Co while using Copper X-Ray tube.

7.3 Minimum 2 theta angular coverage of the fast detector must be at least 4 degree or higher

7.4 The detector must not use any gas or liquid nitrogen gas in it’s operation.

7.5 The quotation should contain all authentic documents and technical details from the original detector manufacturer on the quoted detector.

8. Thin film attachment (Grazing Incidence diffraction setup)

8.1 Parallel beam optics and grazing incidence geometry

8.2 Minimum incidence angle: 0.1^{o}

8.3 Advance analysis software for thin film samples with sub-micron thickness.

8.4 All necessary hardware and software for GID application must be offered in complete in the basic system /or comparable alternative

8.5 Sample Size: ≥ 150mm diameter, ≥ 3 mm thickness

8.6 Sample direction: Horizontal mount

8.7 Optional operation modes : Constant speed rotation (up to 60 rpm), oscillation, sample in-plane rotation scan (continuous, step)

9. Pole figure attachment for texture studies

9.1 Rotation: 0 to 360 degree, one way rotation direction

9.2 Continuous scan speed: 90, 120, 280, 360 deg/min.

9.3 Sampling pitch: 0.1 deg to 15 deg/sec (0.1 deg step)

9.4 Step Scan: 1 to 15 deg/step.

9.5 Sampling time: 0.1 to 999 sec

9.6 Alpha (α) inclination: 0 to 75 degree, step width: 0.1 deg – 15 deg/sec (0.1 degree step)

9.7 Sample vibration: Moving direction 45 degree against the X-ray beam, variable vibration width

9.8 Software to do measurement mode for pole figure, data display mode, correction for random sample, correction for pole figure data, 3-D display mode, data conversion to ODF, ODF calculation, Inverse pole figure calculations.

10. Software

10.1 The system should have provision for interfacing with computer and analysis software should be capable of simultaneous data collection and carry out the analysis. Software should have facility for remote operation and diagnostics of the instrument.

10.2 The software should have options to do background subtraction, smoothing, Kα1, Kα2 separation / elimination, peak search, multiple peak separation, multiple plotting

10.3 Analyzed data to be in industry standard formats as well as made available in ASCII / CSV forms, and exportable to popular platforms like MS Excel. The offered data acquisition software should run on Windows platform. Manufacturer must offer their licensed software developed by them with certificates along with media and exhaustive operating manual(s). Periodic updates of the software should be provided free of cost for a period of minimum five years.

10.4 ICDD data base for peak search and peak fitting ICDD PDF4+ (latest release available at the time of dispatch of the XRD system) database with 5 years validity extendable upto total 10 years from the date of registration, ICSD database must also be offered within the basic system. Licenses to five users for all the databases.

10.5 Search Match software for Qualitative phase estimation based on ICDD database also to be quoted. Automatic phase identification – the software should 'accept' the most likely combination of candidate phases automatically after the search-match process

10.6 Software for crystallography analysis, Space group determination and Reitveld analysis based refinement software, including profiling, quantification of different phases, standardless analysis, indexing, overlapping peak separation, precise lattice constant determination, degree of crystallization of a mixture of crystalline and amorphous substance

10.7 Software for Thin film measurements (data collection and data evaluation)

10.8 A software package for teaching / academic useful should be included.

10.9 All software to be supplied should have license in the name of National Centre for Nanoscience & Nanotechnology

11. Chiller and Circulator

11.1 Suitable external closed loop water chiller of reputed manufacturer to support the XRD system and all standard accessories such as pumps, insulated pipelines of required lengths etc., should be quoted.

11.2 External filter traps should be provided for minimizing the dust settlements from the chiller to the target area.

11.3 It should be possible to connect the pump through UPS system.

12. Deliverable Documents

All documentation shall be in English language. In addition to the hard copies, soft copies of the manuals shall be submitted vide – CD.

a) System Operational Manual in print and CD

b) System Maintenance Manual in print and CD

c) Calibration Procedure Manual in print and CD

d) Complete set of Service Manuals for all OEM products, circuit diagrams of sub systems and electronic boards

e) Complete set of Engineering Drawings

f) Test Reports for all the mode of operations

13. Safety

13.1 The system should confirm to Indian and International safety standards and regulations pertaining to X-Ray Radiation and other hazards. Vendor to provide certificate stating the radiation dosage for the quoted model. This should be below 1 micro sievette / hour at a distance of 10 cms from the instrument at full load.

13.2 X-ray to be ON during the actual experiment only. It should have safety interlock system both for radiation and mechanical failure.

13.3 The system should have a floor-standing cabinet with fully safety interlocked doors for normal access at the front. This cabinet should have stringent safety requirements with respect to contamination of X-Rays and Radiation safety ensuring the negligible radiation outside the cabinet. The cabinet should have

safety requirement as per international radiation and should have auto X-ray off upon accidental opening of cabinet doors during the run.

13.4 The system should have an integrated shutter control and be capable of monitoring and controlling all diffractometer functions such as angle, counts, slits, generator safety etc.,

13.5 Surge Protector is to be quoted and supplied with the instrument. Flawless safety mechanism against over-voltage, over-power, over-current, over load, abnormal input mains voltage or temperature.

13.6 Automatic switch off of X-rays in case the cooling water temperature rises beyond a certain limit or its flow rate drops beyond a certain limit

14. Optional Accessories

14.1 Additional Cobalt X-ray tube

Additional Cobalt X-Ray tube with glass / ceramic insulation, long fine focus (one line and one point focus) with necessary beta filters suitable to fit in the XRD system must be quoted as an optional accessory.

14.2 High Temperature Attachment

13.2.1. High temperature attachment for operating XRD up to 1500^{o}C

13.2.2. Temperature accuracy should be $\pm$ 1^{o}C or better.

13.2.3. The device must have a provision to ramp the sample temperature at rates including 1^{o}C/min, over the entire range of operation.

13.2.4. User should able to programme $\geq$ 20 steps of temperature profile and acquire XRD data at each step.

13.2.5. The usage of this attachment should in no way introduce any limitation in the operation of the diffractometer.

13.2.6. Options to introduce inert gas or vacuum should be provided

14.3 Low Temperature Phase Analysis

Low temperature attachment for carrying out non-ambient phase transition studies in the temperature range from 100K to 500K

14.4 Small angle X-Ray scattering attachment

14.4.1. Set of optics including mirror monochromators and slits for small angle scattering.

14.4.2. Sample holders for solid sample for small angle scattering measurements.

14.4.3. Capillary sample stage for analysis of liquid slurries and suspended particles.

14.4.4. Small angle X-Ray scattering analytical software for calculation of nano-particle size and size distribution etc.

14.5 Micro Area Measurement Attachment

14.5.1. XYZ movement range: ±7.5 mm.

14.5.2. Sample surface observation method: CCD camera image viewed on computer screen with optical microscope which can be used to zoom.

14.5.3. Pinhole emitter slit with variable diameter (0.1, 0.2, 0.3, 0.5, 1, 2 mm etc.).

14.6 Residual Stress Analysis Attachment

14.6.1. Stress Analysis system including the stress analysis sample stand, X-ray tube (Cr), etc.

14.6.2. Residual Stress Analysis Software can perform analysis using the data from either the iso-inclination method or the side-inclination method.

14.6.3. Inclined angle range : 0 to ≥ 50 degrees.

14.6.4. Operation modes : Oscillating, fixed.

14.7 Standard sample for calibration

The NIST standard sample for periodic checking of system alignment to be included

14.8 UPS

Suitable online UPS of suitable power rating should be offered with minimum of one hour backup for the complete XRD system including the X-ray generator, computer, chiller and all the accessories of the system.

14.9 System Upgradability

The possible system upgradability options must be quoted. Any other support/accessory item required for operation of the XRD for the application mentioned in section 1 of this document (part 2)

14.10 Tool-kits and Spare Parts

14.10.1. Complete set of tool-kits for maintenance of High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments.

14.10.2. Complete set of took-kits for chiller.

14.10.3. Complete sets of spare parts including (if appropriate).

14.10.4. Also quote for the spare X-ray tube (as an option)

14.10.5. The spares and support should be available for 10 years from the date of installation and commissioning of the quoted model and manufacturer should give in writing along with offer.

14.10.6. Auto Sampler: Automatic sample changer for more than or equal to 5 samples may be quoted additionally.

14.11 Computer System

A branded desk-top computer with Intel® i5 or better processor, ≥ 3.0GHz speed, 8 GB RAM, 1TB or better HDD with DVD writer, 22” wide screen LCD color monitor and the required graphic adaptor card, latest licensed windows operating system should be quoted. Branded high quality color Laser Printer should also be provided.

15. Installation and Training

15.1 The complete system along with accessories specified in Part B of this tender document must be installed at National Center for Nanoscience and Nanotechnology within 4 months from purchase order.

15.2 The successful tenderer shall coordinate sourcing of the auxiliary & accessory components such as water chiller, UPS, computers etc and delivering the items in the stipulated delivery period.

15.3 The supplier / manufacturer must provide qualified instructor(s) to train NCNNUM research staff on the use of High Resolution X-Ray Diffraction (XRD) System with Thin Film Analysis Attachments and its accessories

including Rietveld or equivalent analysis, thin film & texture analysis for at least 7 working days.

15.4 The supplier / manufacturer must provide training for the operation, trouble-shooting and maintenance complete system.

15.5 Vendor should provide for pre-shipment inspection training for one working week for one person. All costs like airfare boarding and lodging should paid by the vendor

16. Warranty

16.1 Two year from installation and acceptance.

16.2 Purchaser will not pay any amount during warranty period.

16.3 Down period will be excluded from the warrantee period.

17. Acceptance

17.1 The supplier shall install and commission all the accessories covered under the Part B of this tender

17.2 The supplier shall demonstrate performance and quality parameters of the complete system (including all the accessories / attachments) as per design and parameters specified under Part B of this tender. NCNNUM Personnel shall witness the performance tests.

17.3 The supplier shall demonstrate the performance of the system using NIST standard samples.

17.4 The alignment guarantee must be validated at site by using standard reference sample for peak position accuracy. The standard sample is to be included in the scope of supply.

17.5 The supplier should demonstrate all the features of the software and demonstrate the percentage crystallinity determination, crystal size & lattice strain determination, precise lattice constant determination, Reitveld refinement, etc.,

Annexure 'A' – Format for submitting un-priced BOQ along with technical bid

Tender No: NCNNUM/Tender/205 A/2012

S No.	Description	Qty	Make / Model

Signature of the Tenderer

Date:

Seal of the Firm

Annexure 'B' – Format for submitting compliance/response of bidder

Tender No: NCNNUM/Tender/205 A/2012

With reference to the technical details described in different sections of Part B, the bidder shall provide their compliance/response as below format. It should be clear that all the required and optional features must be clearly mentioned.

Section Number	Nomenclature	Bidder's Compliance / Response
1	System Description	
2	X-ray Generator	
3	X-Ray Tube	
4	Goniometer	
5	Optics / Slits	
6	Sample Stage and Sample Holders	
7	Detector	
8	Thin film attachment (Grazing Incidence diffraction setup)	
9	Pole figure attachment for texture studies	
10	Chiller and Circulator	
11	Software	
12	Deliverable Documents, Tool-kits and Spare Parts	
13	Safety	
14	Optional Accessories	
15	Installation and Training	
16	Warranty	
17	Acceptance	
	Annexure 'A' –Un-priced BOQ along with technical bid	

If the tenderer specification has **any deviations** from the specifications or details provided in any of the sections described in Part B needs to be clearly specified in the above table.

Signature of the Tenderer
Date:
Seal of the Firm