



**INDIAN INSTITUTE OF SCIENCE EDUCATION AND  
RESEARCH THIRUVANANTHAPURAM [IISERTVM]**

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GST No.32AAAJI0299R1ZS

IISER/PUR/1011/RV/CIF/SC/24-25

Date 16 Oct 2024

**CORRIGENDUM-I TO TENDER NO  
No: IISER/PUR/1011/RV/CIF/SC/24-25**

Sub: Supply, installation and commissioning of Small and Wide Angle X- ray  
Scattering spectrometer (SWAXS): reg

Ref: Tender Enquiry No. 2024\_IISRT\_829153\_1

1. The above mentioned tender is re-tendered with revised technical specification and BOQ as per Annexure 1.
2. The due date and date of opening will be as follows:-  
Due Date 14 Nov 2024 1500 Hrs  
Date of opening 15 Nov 2024 1530 Hrs
3. All other Terms and Conditions remain the same. Bidders may quote accordingly

Thanking You,

Yours Faithfully

*Amar Sadath*  
16/10/24  
Assistant Registrar (P&S)





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IISER/PUR/1011/RV/CIF/SC/24-25 dt.16.10.2024

**Specifications for Small and Wide-Angle X-ray Scattering Spectrometer**

- Objective:** A state-of-the-art modular SAXS and WAXS system for the analysis of nanostructured materials employing the principle of X-ray scattering at small and wide angles (SWAXS) is desired. A fully automated system featuring an X-ray source, beam preparation optics, detector unit, a computer workstation and required peripheral devices such as control units, chillers and vacuum pumps.

Control, data acquisition, and reporting software shall be included and allow communication with the unit via ethernet connection.

The potential applications include materials science, nanoparticles, nanocrystals, porous materials, catalysts, polymer science, nanocomposites, biological systems, liquid crystals, surfactants, microemulsions, pharmaceutical materials and nanostructured surfaces.

- X-ray source and Generator:** Suitable X-ray generator with High-flux system. If required, it must be connected with an external dedicated chiller. Flux stability better than 0.2 % for 12 h at a temperature of 18 °C, provided by the supplied chiller. Include document proof for this in the compliance statement and demonstrate during the commissioning.
- Goniometer details:** Software controlled alignment and rotation for incidence angle at least  $\pm 3$  degrees with a resolution of at most 0.002 degrees. Software should have options to acquire data for GISAXS experiments with film holder and temperature control from ambient temperature to at least 120 °C. Vendors may quote separately for different goniometer stages they may consider providing.
- Optics:** Suitable high brilliance designed multi-layer X-ray optics providing a highly monochromatic and focused Cu K-alpha beam. Vendors may quote separately for different sources like Mo, Cd, etc they may consider providing as source. Unit should be pre-aligned with appropriate combination of primary and secondary mirrors and optics to realize diffraction profile having features such as high diffracted intensity, high angular resolution, minimum background and respectable signal/noise ratio. Optical assembly must be fully motorized and automated collimation set-up using an advanced Kratky collimator with variable aperture controlled by software. X-ray optics and collimation system is fully evacuated. Should include primary beta filters (if needed), divergence slits, receiving slits and anti-scatter slits. Optics should be able to eliminate the secondary fluorescence.

Spectral Purity: Above 99.5 %

Flux at sample:  $10^8$  photons per seconds or more

- Sample Chamber:** Large multifunctional sample chamber with fast-entry door, viewing window for sample monitoring, fully evacuated beam path for minimum air scattering/absorption

Operating condition: vacuum <1 mbar or controlled atmosphere

High-performance oil-free vacuum pump (<5 min evacuation time)

Variable sample-to-detector distance for SAXS/WAXS measurements

Fully automated alignment system

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17/10/24



Supply lines with quick connectors for quick installation of sample stages inside sample chamber and camera for visualizing of sample.

6. **Sample stage:** High precision motorized X, Y, Z sample stage with translation accuracy better than 1  $\mu\text{m}$  in X and Y and 2  $\mu\text{m}$  Z, respectively. Quick connection of all sample stages without needs of any realignment. Auto recognition of sample stages with relevant control parameters and limits of each stage are automatically loaded into the integrated control unit without switching off generator or control units.

Dedicated sample stage for GISAXS measurement at ambient temperature must be quoted.

7. **Sample holders:** Sample holders must be capable of performing experiments for solid, powder, thin film and solution state samples.

a) **Temperature controlled Sample stage and holder:** Suitable sample stage and holder to be offered to perform measurements from  $-10$  to  $150$   $^{\circ}\text{C}$ , without external cooling attachment. During temperature holding, variation in temperature should be not more than  $1$   $^{\circ}\text{C}$ . This unit must be integrated with the system and computer controlled using the main data acquisition software.

b) **Flow-through cell:** for automated sampling of liquid samples with external hose connectors with Low-noise capillary (1 mm), temperature range:  $10$   $^{\circ}\text{C}$  to  $60$   $^{\circ}\text{C}$ . Vendors may quote for thermostated and regular quartz and silica capillaries operational with their stages or holders. External samples feeding should be possible without breaking the vacuum.

- 8) **Detector and variable SDD:** Suitable detector for SWAXS experiments. This feature to be included based on a variable sample to detector distance (SDD) and allowing performing fully automated SAXS & WAXS measurements. It may be achieved by moving the sample stage or detector along the optical path (optics/collimation/beam stop) should not require a re-alignment nor calibration measurements. Vendors may provide technical and price quote for different detectors they can offer for their systems viz CCD, Image Plate, Solid-state etc. with different resolutions may be provided as optional items.

Data acquisition mode: simultaneous read/write with zero dead time

High dynamic range  $a \times 10^8$  cps/mm<sup>2</sup>

No readout noise or dark current for best signal-to-noise ratio

Smallest pixel size of 33  $\mu\text{m}$  or higher and sharp point-spread function for superior spatial resolution

Vacuum-compatible, no parasitic scattering due to detector window

q-range:  $0.03$   $\text{nm}^{-1}$  or lower to 18 or more  $\text{nm}^{-1}$

- 9) **Beam stop:** Fully motorized software regulated semi-transparent beam stop for optimal adjustment for transmission and GISAXS measurements. Direct beam position and transmission recorded on primary detector with no additional calibration necessary. For direct measurements without beam stopper in path, it should be possible to remove beam stopper from path by software and brought back.

- 10) One or two standard samples to validate, by the user, the instrument alignment and diffraction angle accuracy should be supplied. During the installation their usage should be demonstrated.

- 11) **Software:** Data acquisition software for system control and data acquisition, control of all system components (X-ray source, XYZ stages, all sample stages, detectors, etc.) Software

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17/10/24

must be equipped with modern user interface, easy and quick data acquisition and straight-forward functionality for series measurements. Software should be capable of recognizing hot swap od sample station and addition or deletion of any accessory certified by the vendor. Comprehensive SWAXS data treatment and processing software: 2D/1D data processing incl. conversion to q-space, absorption/ background correction, Guinier analysis and Porod correction, etc. Batch processing concept enables handling of many SWAXS data sets: hierarchical binary hdf5 file format (following the Nexus convention layout). Data format compatible with standard applications and data evaluation programs used in the scientific community.

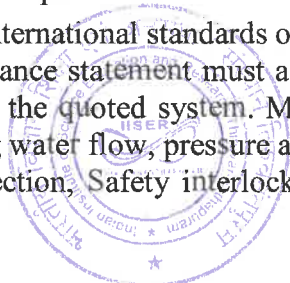
- 12) **Computer:** Suitable computer with 27" color high resolution OLED monitor and color laser printer to be supplied along with system. An additional computer with all software should be provided for off system data processing and analyses.
- 13) **Water chiller:** If required, a suitable small sized and low noise water chiller of a reputed brand capable of working in weather conditions of Thiruvananthapuram such as ambient temperature up to 40 °C and high humidity, to be offered.
- 14) **UPS:** Vendors may quote for suitable UPSs. This would be an optional feature.
- 15) **Warranty:** 1 year of standard warranty and additional 4 years (total of 5 years) from the date of installation for the entire system including all hardware suppliers along with regular maintenance checkup must be provided. During warranty period if any spare needs to be replaced, it must be supplied and repaired free by the vendor free of cost. A 3-year annual maintenance contract (AMC) after the expiry of the warranty (i.e., after 5 years) should be offered free of charge. Any variation in warranty terms may lead to rejection of your tender as it would have cost implications.

**Manual/circuit diagram/instruction sheets:** All the manuals including circuit diagrams and instruction sheets (X-ray diffractometer system) must be supplied in English for the purpose of in-house service engineer's reference. Downtime during the warranty period will not be considered as part of warranty period. Parts replaced during failure in the warranty period must be supplied on delivery duty paid basis, without any cost implication to IISER-TVM. No payment will be made for failure replacement during warranty period.

- 16) **Pre-Installation requirement:** Necessary pre-installation advice, room plan, electrical requirements and other site essential details should be sent immediately after the placement of the order.

**Installation in India:** List of Indian users of the quoted model of the equipment along with their complete contact details and date of supply of the instrument should be provided.

- 17) Supplier must specify the upgradeability conditions for the hardware and software parts of the system.
- 18) **General electrical power supply:** The site provides stable electrical power supply as per Indian standards in single phase 220 V/3-phase 440 V, and 50 Hz. The supplied system must work with these power requirements.
- 19) Compliance to international standards on mechanical, electrical, electromagnetic & radiation safety. A compliance statement must accompany the bid giving the list of safety standards implemented for the quoted system. Minimum safety check requirements: deviation from specified cooling water flow, pressure and temperature, generator overload detection, shutter malfunction detection, Safety interlocks for radiation and mechanical failure and suitable



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Xray-ON indicators during actual operation, checks against over voltage/power/current/load. Copy of the AERB Type approval certificate to be provided along with bid.

- 20) **Service support** Supplier has to guarantee for service support for offered system with availability of all spares for minimum 15 years from date of installation.
- 21) **Installation, Commissioning and Training:** Installation, operation and application training to be arranged by the supplier free of cost at IISER Trivandrum site. The instrument must be installed, tested and commissioned by qualified engineers/representatives of the manufacturer. Performance must be demonstrated at the installation site by using the supplied standards, as well as the test samples supplied by IISER-TVM. Full in-person training of technical person/s including handling instrument, trouble shooting of routine problems, data acquisition and data interpretation must be provided.
- 22) All items necessary to demonstrate the specifications, even if not explicitly mentioned here, shall be included in the scope of the supply.

**Optional items**

- 1) Detector 1
- 2) Detector 2
- 3) Detector 3

Technical details and resolution of the detectors must be provided along with the quote.

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