

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE
2A & 2B , Raja S.C. Mullick Road, Jadavpur, Kolkata-700032

NIT No. :IACS-G/SSPDM/2023-24/57

Date: 31.01.24

Sealed tender in two bids system (Technical bid and Price bid) is invited from bonafide, resourceful and eligible manufacturer/exclusive distributor/vendors for the purchase of **Pulsed laser deposition (PLD) chamber with in-situ RHEED facility** under the Central Scientific Services, IACS.

Part-I (Technical Bid) of the tender should contain technical specifications in detail as well as commercial terms and conditions. Part-II (Price Bid) should clearly indicate group-wise price, if needed, as mentioned in the technical bid. The Technical Bid and Price Bid are to be submitted in separately sealed envelopes, distinctly marked accordingly and both to be put inside another envelope, that should be sealed and superscribed with tender notice no. and due date. The bidders may submit bids duly signed in their own letterheads.

Completed tender bids should reach the office of the **Registrar, Indian Association for the Cultivation of Science (IACS), 2A & 2B Raja S. C. Mullick Road, Jadavpur, Kolkata- 700032** on or before the scheduled date and time specified below:

Tender Notice No.	IACS/ SSPDM/2023-24/57 dt.31.01.2024
Last date and time of submitting tender	21/02/2024, within 3.00 PM
Pre-bid meeting(date, time & mode) to discuss technical specification	10/02/2024, 1.00 PM (online mode*)
Date and time of opening tender (Technical Bids)	21/02/2024, 04.00 PM
Place of opening tender	Venue would be declared later
Date and time of opening of Price Bid	The Price Bids of the bidders qualifying the technicalbid will only be opened, the date of which will be intimated to the short-listed bidders at their email addresses. The rest of the bids will be rejected.
Contact	Dr. Devajyoti Mukherjee Email: sspdm@iacs.res.in Tel.+91 33 2473 4971 [Ext 2123]

*If you wish to participate in the online Pre-bid meeting, please write a mail to the email account (sspdm@iacs.res.in) on behalf of your company so that the required link can be sent prior to the online meeting.

The technical bids will be opened first to judge/evaluate the technical specifications of the said instrument and thereafter the price bids of only technically qualified bidders will be opened.

Technical Bid Evaluation: The Technical Bids will be evaluated in the presence of the representatives of intending bidders who will be able to clarify technical aspects of their bids, if any, required by the Technical Evaluation Team.

Opening of price-bid: The Price Bids of the bidders qualifying the technical bid will only be opened, the date of which will be intimated to the short-listed bidders at their email addresses. The rest of the bids will be rejected.

Please note that IACS will not provide any accommodation or reimburse any expenses to any of the bidders for attending opening of technical bid.

Quotations received incomplete or beyond the stipulated time will be summarily rejected.

1. TECHNICAL BID

The technical bid should contain technical specifications and should be kept in a separate sealed envelope duly superscribed as “TECHNICAL BID” on the outer cover of the envelop as already detailed above. It should be clearly mentioned on the envelope as "Technical Specification for Pulsed laser deposition (PLD) chamber with in-situ RHEED facility”.

Technical Specifications for “Pulsed laser deposition (PLD) chamber with in-situ RHEED facility”

Part A

1.1. Pulsed laser deposition (PLD) chamber compatible with in-situ RHEED facility

Part / Unit	Item	Description
Material, Shape, Dimension, Service Ports	Material and Treatment	SS304, EP finish
	Shape, Dimension and Service Ports	Spherical chamber. Approx. 10 to 14 inch in diameter with appropriate service ports for: 1. Laser beam entry window 2. Muti-target carousel 3. Substrate holder/heater 4. Vacuum pressure gauges (2 nos.) 5. Main evacuation path for PLD chamber 6. Viewing port with shutter (2 nos.) 7. Process gas inlet 8. Two ports for RHEED attachment (screen and electron gun) 9. Extra ports (min. 2 nos.) for any future upgrades with standard CF flanges. (Vacuum chamber ports to be compatible with the pumps, fore-pumps, gauges, RHEED parts and all other accessories.)
Vacuum requirement	Base pressure	$< 5 \times 10^{-8}$ mbar
	Pumping-down speed	From ATM to $< 5 \times 10^{-6}$ mbar within 30 min.

Pumping System	Main pumping system	Turbo Molecular Pump (Pumping speed > 250 l/s for N ₂) with manual SS gate valve with bellow sealed shaft movement.
	Sub/backing pumping system	Rotary Pump (Pumping speed > 200 l/m) with manual angle valve.
	Differential Pumping system for RHEED	Combined pumping station including Turbo molecular pump (67-70 l/s for N ₂) and backing/rotary pump with compatible full range pressure gauges for RHEED part. All hosepipes and accessories to connect to the RHEED part with PLD chamber to be provided.
Vacuum Pressure Gauges	High Vacuum range	Cold cathode vacuum gauge (Measurement range 2×10^{-9} to 1×10^{-2} mbar)/ Nude ion gauge (Measurement range 2×10^{-10} Torr to 1 mTorr)
	Process pressure range	Capacitance manometer (Measurement range 1 Torr to 1000 Torr)/ Pirani gauge (Measuring range: 10^{-4} to 10^3 hPa)
Laser Beam Delivery to PLD chamber	Lens, Size and material	Lens holder attachment with XYZ movement of lens for focusing the laser beam on target. 2" dia., UV grade fused silica lens and S1UV grade fused silica/ synthesized quartz laser entry window with manual gate valve.
	Laser beam incidence angle	45 degree from horizontal direction
	Transmittance	> 93% (for KrF)
Process Gas Inlet	High Vacuum	Variable leak valve
	Cut valve	Manual valve
	Digital mass flow controller (MFC)	100 SCCM of Oxygen gas
Service Ports (include all listed ports)	Laser beam entry window	CF4.5"
	Muti-target carousel	CF8"
	Substrate holder/heater	CF8"
	High vacuum pressure gauge port	CF2.75"

	Process pressure gauge port	CF2.75"
	Process gas inlet port	CF2.75"
	Main evacuation path for	CF6"
	Viewing ports (2 nos.)	CF4.5" to CF6" (Kodial/toughened glass view port with shutter)
	RHEED Electron gun	CF4.5"
	RHEED fluorescent screen	CF6"
	Extra port (min. 2 nos.) for any future upgrades	Standard CF flanges (Blank)

1.2. Multi-target carousel

Part / Unit	Item	Description
6-axis Multi-Target Carousel	Target size and loading number	Target stage capable of holding 6 targets of 1-inch diameter each.
	Target selection/revolution system	Stepper motor controlled with suitable software for PC control
	Target Rotation/rastering	Motor drive with independent controller
	Shutter/shield assembly	Contamination shield/shutter for exposing only one target at a time to be provided.

1.3. Substrate holder-heater

Part / Unit	Item	Description
Substrate Heating Unit	Maximum temperature	Up to 1,000 degree C in unloaded condition (>800 degree C rated)
	Temperature uniformity	Within 2.5 degree C in 10mm x 10mm area at 800 degree C as a test data in factory
	Substrate size	Substrate holder for holding 10 mm x 10 mm to 1 inch x 1 inch substrates

	Substrate moving range	In and out movement of heater in-situ for aligning to RHEED unit with 0 to 20 mm in Z direction (manual)/motor drive. Manual magnetically coupled shutter for substrate heater to be provided.
	Power supply control	DC power supply
	Temperature sensor	K type sheathed thermocouple
	Temperature control	Programmable temperature controller

1.4. PLD Chamber frame and System control unit

Vacuum gauge controllers	Vacuum gauge controller / display for vacuum gauge sensors	
Chamber Frame with Control Rack	Power supply and controller rack for all controllers including RHEED unit. Control panels and main circuit breakers to be provided. Control signal and power lines to be connected between frame and rack.	
Purge & Venting gas and Process gas	1 line for Dry Nitrogen, 4 lines for Process gas	
Control software for PC	Suitable software for controlling listed tasks	• Substrate heating control • Target selection • Target rotation and rastering control • Substrate rotating control • MFC flow rate and pressure control • Vacuum pump turn on/off

Part B

2. *High Pressure Reflection high energy electron diffraction (RHEED) System*

Part / Unit	Item	Description
RHEED Unit with differential pumping unit	RHEED electron gun	Electron source with maximum acceleration voltage range: 30-35 keV. CF2.75" flange mount
	Power supply	Source power supply, deflection power supply, min. 5 m cables
	RHEED screen	RHEED screen with shutter, mounted on CF6" chamber flange with 70 mm screen.
	RHEED operating pressure	0.5 Torr (Provision for differential pumping)
	Essential features	• Remote control • Basic beam blanking • Magnetic shielding of the beam pass • Mechanical tilt, allowing proper pre-positioning, and allows the RHEED to follow different sample positions • Electronically controlled X and Y • Electronic Beam Finder • Gate valve (VAT) between RHEED source differential pumps and PLD chamber • External magnetic shielding for the electron gun.

	Data acquisition and RHEED software	• High Resolution, high Sensitivity and high Speed camera 1” CCD to capture RHEED patterns onto a Data acquisition system. Minimum 2500 x 2100 pixels of 4.54 μm and 15fps, Standard hardware such as PoE GigE frame digitization board. • RHEED Gun Controller. • Tele ZOOM lens for high pressure RHEED. • Data Acquisition capabilities: • Multiple Image mode, focus mode, scan mode, movie mode, growth rate mode, real-time exposure control & Background Subtraction, line Profile Analysis, sequential acquisition of diffraction images, multiple RHEED Oscillation Monitoring and RHEED Image Library • PC connection with software Pre installed PC with TFT monitor. • One analysis only software key for offline post analysis on separate computer.
	Spare Parts	• Filament - 5 nos (Ability to replace onsite without returning module) • Cathode unit - 1 no. • Fluorescent screen - 1 no.

	Compatibility with PLD chamber	• Certificate from RHEED manufacturer that they will manufacture the RHEED, install and integrate into any PLD system having provisions of RHEED ports for source and screen. • Vendor must have minimum 3 successful integrations of High Pressure RHEED in PLD chamber installations in the last 5 years. Reference letters of installations to be provided. RHEED oscillation pattern and RHEED intensity data should be provided for the quoted instrument from previous such installations.
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Pre-Qualification criteria:

A) The local vendor of the Original equipment manufacturer (OEM) must have supplied at least 5 similar equipment to research Institutes/Universities/other organizations in India or abroad. Please attach a reference list of supplies in the last 5 year with contact details (Name, Phone, email address) of at least 3 users.

B) The company should be an OEM of the equipment with expertise of manufacturing over 10 years, please attach exclusive authorization certificate specific for this tender with quote without which bid will be rejected. This criterion is the proof of accountable service support by vendor & OEM.

Warranty: Minimum 1 year while 3 years extendable warranty is preferred. The warranty will be valid from the date of actual installation.

Proper installation and training should be provided by the vendor. Onsite after sales service, within 48 hours of reporting any problems, is mandatory. It is essential to have a technical person stationed in Kolkata.

A compliance table (see below) must be prepared and submitted along with the technical bid.

Sr. No	Tender specification	Your instrument offered specification	Extent of compliance

2. PRICE BID:

The financial bid indicating (item-wise) price for the item(s) mentioned in the technical bid should be kept in a separate sealed envelope duly super scribed as “PRICE BID” on the outer cover of the

envelop as already detailed above. Price bids of only technically qualified bidders will be opened and they will be intimated the date and time of the opening of price bid at their e- mail ids. Rest of the bidders will stand rejected.

PRICE: Price to be quoted on CIF Kolkata and also FOB basis.

3. BID SECURITY:

- a. An Account payee Demand Draft/Pay Order of any of the Nationalized Banks for Rs. 6,00,000/- (Rupees six lakhs only) drawn in favour of “Indian Association for the Cultivation of Science (State Bank of India, Jadavpur University Branch, A/C No. 11079699211, IFSC: SBIN000093, MICR Code: 700002048)” is to be furnished by the bidders except those who are registered with the Central Purchase Organizations, National Small Industries Corporation or the concerned Ministry or Department, as Bid Security money or Earnest Money Deposit (EMD). Alternatively, the Bidder shall have the option to furnish the EMD in the format of Bank Guarantee (BG).
- b. The Demand Draft for the Bid-Security should have at least 90 (ninety) days validity period of opening of the bids.
- c. In case of non-award of the work the Bid Security money would be returned to the unsuccessful Bidders.

4. PERFORMANCE SECURITY:

An Account Payee Demand Draft on any nationalized bank of India of 10% of the order value in the name of “Indian Association for the Cultivation of Science” is to be furnished by the successful bidder as Performance security. Performance security money should remain valid for a period of 60 days beyond the date of completion of all contractual obligations of the supplier including warranty obligations. Bid security money or EMD will be refunded to successful bidder on receipt of the Performance security money.

5. TERMS OF PAYMENT:

Payment will be made through irrevocable Letter of Credit in two instalments. 90% of the money will be released on submission of shipping of documents. Remaining 10% will be released after successful installation of the instrument.

6. GENERAL INSTRUCTIONS:

1. Validity of tender: Tender submitted should remain valid for at least six months from the date of opening the tender. Validity beyond six months from the date of opening of the tender shall be lapsed by mutual consent.
2. The tender should accompany a compliance chart.
3. Incomplete and conditional tenders as well as tenders received after the due date will be summarily rejected without assigning any reasons thereof.

4. At any time prior to the bid due date, IACS may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder during pre-bid meeting, modify the bidding documents. The amendment(s) will be notified on the institute website. Prospective bidders are advised to occasionally visit the website (www.iacs.res.in/tender) for any amendment.
5. Installation/Demonstration/Application training at site: Installation & user training at IACS, free of cost by the supplier.
6. Service facility: In India, preferably Kolkata, supplier should mention their details of service setup and man powers who are responsible for after sales support. Response time should be within 24 hrs.
7. The model number, make and a printed literature of the product should be submitted positively.
8. Proposed delivery schedule should be mentioned clearly.
9. Manufacturers / exclusive distributors / vendors should have history of supplying this type of instruments to this or other scientific organizations. Availability of a list in this regard would be preferred.
10. Authorized dealership certificate should be provided in case of principal manufacturing company is not quoting directly.
11. Guarantee certificate, users manuals etc. are to be handed over to the user after successful commissioning of the system.
12. In the event of date being declared a closed holiday for purchaser's office, the due date for submission of bids and opening of the technical bids will be the following working day at the appointed time.
13. In case of any dispute, the decision of IACS authority shall be final and binding on the bidders.
14. For any clarification regarding technical specifications, information etc., please send your queries to Dr. Devajyoti Mukherjee (sspdm@iacs.res.in).
15. The authority of IACS reserves the right to reject any or all of the tenders received without assigning any reason thereof.

Registrar