

14 June, 2017

PH/SMI/169/2017-18

Tender Notification for the Procurement of Two Identical ‘High Pressure RHEED (Reflection High Energy Electron Diffraction) System and Accessories’

(Last Date for submission of tenders: 3rd July, 2017)

Kindly send your best quotation for two identical high pressure RHEED system and accessories with the following technical specifications on C.I.P. Bangalore basis. Your quotation should clearly indicate the terms of delivery, delivery schedule, estimated delivery date, and payment terms. The tender should be submitted in two separate sealed envelopes - one containing the technical bid and the other containing the commercial bid, both of which should reach us, duly signed on or before 17:00 hours on 3rd July, 2017.

One set of (technical + commercial) bids should be addressed to:

*The Chairman,
Department of Physics
Indian Institute of Science (IISc)
Bengaluru, India - 560012*

This set (technical + commercial) of sealed bids should be sent to:

*Dr. Srimanta Middey
Assistant Professor
Department of Physics
Indian Institute of Science (IISc)
Bengaluru, India - 560012.
Ph: +91-80-2293 2861; email: smiddey@physics.iisc.ernet.in*

The other set of (technical + commercial) bids should be addressed to:

*The Chairman,
Solid State and Structural Chemistry Unit
Indian Institute of Science (IISc)
Bengaluru, India - 560012*

This set (technical + commercial) of sealed bids should be sent to:

*Dr. Naga Phani B Aetukuri
Assistant Professor
Solid State and Structural Chemistry Unit
Indian Institute of Science (IISc)
Bengaluru, India - 560012.
Ph: +91-80-2293 3534; email: phani@sscu.iisc.ernet.in*

Please enclose a compliance statement along with the technical bid

Technical Specifications for High Pressure RHEED (Reflection High Energy Electron Diffraction) Systems

The system will be coupled with pulsed laser deposition (PLD) chamber to monitor thin film growth and in-situ characterization.

1. Electron source package

- 1.1. Electron gun should be functional in oxygen partial pressure of 10^{-8} torr to 0.5 torr (or better) of PLD chamber.
- 1.2. Electron gun should be capable of producing 1-40 keV (or better) electron beams with stability better than 5%. The tenderer can quote required components as options to achieve higher stability of the emission current ($\sim 1\%$).
- 1.3. Spot size should be smaller than $70\mu\text{m}$ at a working distance of 150 mm.
- 1.4. Electron source should be mounted on CF63 flange.
- 1.5. The electron gun should be magnetically shielded.
- 1.6. This attachment should allow adjustable mechanical tilt to position electron beam on various parts of the sample.
- 1.7. Electron beam should be electronically controlled to allow angular deflection ($\pm 6^\circ$ or higher) using low aberration magnetic coils.
- 1.8. Source power supply should be provided.
- 1.9. Source power supply should allow to control manually, and monitor accelerating voltage, filament current and emission current.
- 1.10. A remote controller should be also implemented to control RHEED intensity, angular beam deflections, beam focusing.
- 1.11. Electronic beam finding should be possible.
- 1.12. The tenderer should provide a CF38 gate valve to connect this electron source package with the PLD chamber. The details of the manufacturer should also be provided if the tenderer is purchasing the gate valves from a third-party vendor.

2. Double differential pumping package

- 2.1 Two identical Turbo Pumps with pumping speed at least 60lts / sec with DN63 CF flange.
- 2.2 The backing pump for each turbo should be diaphragm pump with a pumping rate of at least $0.5 \text{ m}^3/\text{h}$.
- 2.3 Ultimate pressure obtained by the turbo should be lower than 10^{-8} torr.
- 2.4 The pumps should be air-cooled, and operate with 220V, 50 Hz single phase power.
- 2.5 All required vacuum accessories (flexible hose, zero length reducer, Tee) to connect the pumps with the electron source package should be provided. These items should be nonmagnetic.

- 2.6 Three complete set of required copper gaskets should be provided.
- 2.7 Two complete set of all necessary nuts, bolts should be provided. These items should be nonmagnetic.
- 2.8 Compact pressure gauge to measure 5×10^{-9} to 1000 mbar should be supplied.
- 2.9 All required electrical cables, controller, sensor cables should be provided.

3. RHEED Data acquisition and processing

- 3.1. 70 mm RHEED screen with a shutter should be mounted on a CF100 flange. This will be introduced into the PLD chamber.
- 3.2. The shutter should be operable (manually) from outside.
- 3.3. Peltier cooled high resolution camera with the following specifications should be supplied; Pixel number: 650 X 400 pixels (or better); Bit depth: 12 bits (or better); Frame rate: 100 frames/sec (or better).
- 3.4. It should be possible to externally trigger the camera with a TTL pulse.
- 3.5. Optimized optics (lens, optical rail, rail carrier) to allow zoom in/out should be supplied.
- 3.6. All standard hardwares (digitization board, flange mount, cables) should be supplied.
- 3.7. **RHEED software:** The RHEED software package should include complete set of software suit for followings:
 - 3.7.1. Data acquisition modes: single image mode, multiple image mode, focus mode, scan mode, movie mode, growth rate mode
 - 3.7.2. Real time zoom: live video zoom from 25% to 300% (or better).
 - 3.7.3. External trigger: The software should allow to start or stop data acquisition using external signal.
 - 3.7.4. Image analysis: line profile analysis, statistical analysis, surface plots, contour plot etc.
 - 3.7.5. Growth rate analysis via RHEED intensity oscillations.
 - 3.7.6. Image, video, data export.

4. Spare parts

- 4.1. Five spares of filament should be provided.
- 4.2. Filament replacement kit should be provided.

5. Other Requirements, Options and Accessories

- 5.1. The tenderer can quote required components (mentioned in item number 1.2) as options to achieve higher stability of the emission current ($\sim 1\%$).
- 5.2. The high pressure RHEED system must be functional in the pressure range of 10^{-8} torr to 0.5 torr (or better) of PLD chamber.
- 5.3. Power requirement $\sim 230V$, 50Hz, single phase

- 5.4. Complete specification for the computer, which will be compatible with the RHEED software should be provided with the technical bid.
- 5.5. A list of at least 5 references, where systems with similar specifications have been installed in the recent 3 years, must be provided.
- 5.6. The tenderer should provide RHEED oscillations data for SrTiO₃ homoepitaxy growth (obtained in their earlier systems) with the technical bid. The tenderer should demonstrate SrTiO₃ homoepitaxy deposition with RHEED intensity oscillations during installation.
- 5.7. The prices of 1, 2, 3, and 4 should be itemized. The indenter reserves the right to place an order for any combination of the 1,2, 3, and 4.

6. *Terms and Conditions*

- 6.1. The vendor is responsible for the installation of the system at the institute.
- 6.2. The price quotation should include the cost of installation and training of potential users.
- 6.3. The system should be provided with at least one-year warranty on all parts and labor.
- 6.4. The vendor should have qualified technical service personnel for the equipment based in India.
- 6.5. The lead-time for the delivery of the equipment should not be more than 6 months from the date of receipt of our purchase order.
- 6.6. The indenter reserves the right to withhold placement of final order. The right to reject all or any of the quotations and to split up the requirements or relax any or all of the above conditions without assigning any reason is reserved.

Yours Sincerely,

Dr. Srimanta Middey
Assistant Professor
Department of Physics
Indian Institute of Science (IISc)
Bengaluru, India - 560012.
Ph: +91-80-2293 2861
Email: smiddey@physics.iisc.ernet.in

Dr. Naga Phani B Aetukuri
Assistant Professor
Solid State and Structural Chemistry Unit
Indian Institute of Science (IISc)
Bengaluru, India - 560012.
Ph: +91-80-2293 3534
Email: phani@sscu.iisc.ernet.in