

No. D-2/Equipment/2018-19/TEM

Date : 09.01.2019

## ICMR-National Institute Of Cholera & Enteric Disease

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NIT. No. : 2019\_DoHR\_395593\_1

**Tender Fee: 2,500.00**  
(non-refundable)

### Publication of Corrigendum to Tender Notice

1. Last Date of submission of Tender : 15.02.2019 (1.30PM)
2. Date of opening of Tender : 15.02.2019 (3.00PM)

Sealed Tenders are invited to supply of the following Laboratory Equipment at ICMR-N.I.C.E.D., Kolkata

Sl. No.	Tender Code No.	Description	Tender Fees (Rs.)	Estimated cost of the equipment (Rs.)	EMD (Rs.)	Last date of submission of tender (upto 1.30 P.M)	Date of opening of tender (3.00 P.M)
1.	D-2/Equipment/ 2018-19/TEM (NIT No. 2019_DoHR_395593_1)	Supply of "Transmission Electron Microscope"	2500.-	8,00,00,000.	16,00,000.	15.02.2019	15.02.2019

For details information please visit our website – [www.niced.org.in](http://www.niced.org.in), [www.icmr.nic.in](http://www.icmr.nic.in) and NIT No.2019\_DoHR\_395593\_1.

## **Revised Specification for Transmission Electron Microscope**

For the Electron Microscopy Facility of ICMR-NICED, Transmission Electron Microscope for conventional TEM, Single Particle Analysis and 3D Tomography at ambient and cryogenic temperatures for life science applications with accessories is required with the following specifications. The microscope will be used to conduct research in the areas of bacteriology, virology, cell biology and structural biology, and will involve the recording of images of unstained, rapidly-frozen thin films or negatively stained and ultrathin-sectioned biological material.

### **1) Transmission Electron Microscope**

- i) **Accelerating Voltage:** Should be 80-200 kV (variable either in steps or continuous). The submitted documentation should clearly state the range of the system.
- ii) **Electron Source:** Schottky Field Emission Gun with energy spread of electron beam  $\leq 0.8\text{eV}$ . Life of Emitter should be at least three years or more.
- iii) **Resolution:** Point-to-point resolution = 0.30 nm or better. Lattice resolution = 0.18 nm or better.
- iv) **Magnification range:** 50x to 450,000x or higher range of magnification.
- v) **Lens system:** Four stage lens system (consisting of condenser lens, objective lens, polarization lens and stigmator lens) is preferred and all apertures must be motorized. However, constant power objective lens with low hysteresis is desirable. Also the system should have cryo pole piece. The lens system should provide distortion and rotation free images and the spherical aberration of objective lens should be 2.7 mm or lower.
- vi) **Specimen holders:** Single-tilt holder ( $\pm 70$  degree) for room temperature applications including tomography, a long duration cryo transfer and a high tilt cryo tomography holder ( $\pm 70$  degree or higher) of latest design for stable imaging should be provided with the system.

- vii) **Specimen chamber:** Eucentric Goniometer fully motorized stage with all 4 axes ( $XYZ\alpha$ ) with accurate specimen position recall and retrieve facility. Specimen tilt angle should be at least  $\pm 70$  deg or higher. Drift should be  $\leq 1$  nm/minute with a standard holder. Specimen stage area should have long-term cryo stability.
  
- viii) **Vacuum system:** Should be equipped with fully automatic oil-free clean, ultrahigh differential pumping system with turbo molecular/ion pumps. The insertion of the specimen into the TEM vacuum via the air lock should be quick and easy, so that successive grids can be loaded. Suitable vacuum pump for Camera Section should be provided. Fully automatic sequential control for operation of vacuum pumps. FEG gun area vacuum should have pressure  $\leq 10^{-6}$  Pa and TEM column area vacuum should be  $\leq 10^{-4}$  Pa.
  
- ix) **Technology:** A latest generation technology model should be provided for both cryo and room temperature applications.
  
- x) **Imaging and operation:** The TEM should operate in the following modes - bright field, dark field, atomic resolution imaging and low/minimum dose. It should be possible to use well-established low-dose imaging procedures, in which there are separate pre-set Search/Focus/Exposure conditions.
  
- xi) **Software:** The TEM should be equipped with the latest software platform for the operation of the microscope. General image acquisition software for capturing images of standard negatively stained sample and ultrathin section samples should be provided. Updated and automated image acquisition software packages for single particle and tomography data collection (minimum incremental angle of 1 degree) with requisite license should be provided. The acquired data & metadata can be exported from the proposed TEM system in multiple formats (eg .mrc, .tiff, .jpeg, .txt, .xls etc). Offline data processing software with requisite license for single particle and tomography should be provided. Details of the proposed software should be included in the tender submission along with any known, or suspected, incompatibilities with other software packages. The software provided should be updated during annual servicing with available updates. The software provided is expected with full documentation.

- xii) **Automatic system:** It should be possible to align both electron gun and beam at selected acceleration voltages and recall that for automatic alignment while switching from one acceleration voltage to another. Automatic system that enables loading of samples with minimal breaks in vacuum is preferable.
  
- xiii) **Cryo transfer system:** Cryo-transfer station should be provided with the system, as required. All accessories for operation in cryo- as well as ambient temperature should be provided and switching between the two temperature conditions of operation should be simple and fast.
  
- xiv) **Instrument stability:** A robust system should be provided for maximum system stability, high throughput and protection from interference by an outer shell. Remote operation of the microscope should be possible.
  
- xv) **Instrument control:** The proposed TEM will be fitted with controls that are simple enough to be understood by a 'non-expert' user and robust enough for heavy daily use. The software controlling all detectors/cameras must be fully embedded into the TEM's operation system. The safety controls must be implemented in software as well as in hardware for protecting the operators, instrument, detectors and specimens. It should be possible to adjust easily and in a few minutes the gun voltage to any value between 80 and 200 kV.

## 2) **Detector**

The microscope should be equipped with the following detector/cameras with automatic capacity to exchange:

- i) **Direct Electron Detector:** Direct detection camera having the following minimum specs with DQE of 0.25 at 1/2 Nyquist or higher, Physical pixel size of 14 $\mu$ m or lower. Complete software for all camera functions, low dose readout and low dose automated data acquisition. Automated magnification calibration and adequate safety measures for camera should be available.

- ii) **CMOS Camera:** High Resolution retractable CMOS camera of minimum 4k x 4k pixel (16M pixel) full frame CCD with near 100 % fill factor. User-friendly software integrated with TEM system software along with measurement and diffraction analysis package as standard feature. Required PC/workstation should be provided for both cameras.

### 3) **Vitrification Device**

Vitrification system capable of blotting followed by rapid cooling of aqueous samples. The blotting should occur on both sides of the grid at the same time to allow even spreading/drying of the sample. Operational parameters should be reproducible and device should allow vitrification with high throughput with an easy and straightforward control of the vitrification process. It should be possible to control different parameters associated with the environment of the chamber and the blotting & plunging process.

### 4) **Cryo Preparation Tools**

Plasma cleaner, Cryo transfer station, cold stage controller, dry pumping stations and all cryo-tools etc. for holders should be provided.

### 5) **Computational Infrastructure for recording, storage and analysis**

- i) Adequate computational infrastructure for data recording, transfer and storage along with all required accessories should be provided with the system.
- ii) Computer with adequate capacity for acquiring and storage of direct detector generated data.
- iii) Separate workstations should be provided for offline data analysis/processing.
- iv) High Speed storage appliance with adequate capacity is preferred.

Overall, the computational infrastructure provided should allow smooth operation of the system and transfer, maintenance and analysis of the recorded data.

**6) Chiller, compressor and UPS**

Chiller, Compressor, UPS of adequate capacity (with at least 30 mins backup) to ensure smooth and noiseless operation of all components should be provided.

**7) Liquid Nitrogen Dewar**

It is expected to supply at least one 10L liquid nitrogen dewar, which will directly connect with the microscope for constant supply of liquid nitrogen to the microscope. Also small (approximately 2L capacity) and medium (approximately 5L capacity) liquid nitrogen dewars are to be provided.

8) Adequate consumables, spares (for at least three years) and tools should be provided.

9) The calibration standard for magnification and resolution should be supplied.

**10) Warranty**

A minimum warranty period of 5 years is expected for the proposed TEM. All warranty certificates should be provided by the Principal Company. During the warranty period, ICMR-NICED will expect a maximum on-site attendance time of 24 (twenty-four) hours from first notification of a problem with the TEM.

**11) Documents**

- i) List of research publications using the microscope should be provided.
- ii) List of installations of the quoted model in India and abroad should be provided.
- iii) The year of launch of the microscope should be provided.
- iv) A certificate of compliance has to be provided.
- v) It should be specified that the hardware components and the software meant to handle the microscope would not go obsolete for at least five years and the required spares would be available for at least ten years. A statement/letter to that effect may be included alongside the tender.

## **12) Training**

- i)** On-site training at NICED on the operation of the proposed TEM will have to be provided by a qualified Application Specialist. If any specialised training is needed in manufacturer's factory/training academy, it has to be provided to the scientist/scientists concerned free of cost.
- ii)** Initial training has to be provided to the EM department with the emphasis being on both theory and practical training to benefit from any advanced features of the TEM.
- iii)** Initial maintenance training has to be also provided to technical staffs in the division of EM, allowing basic procedures to be carried out in-house to maximize the potential uptime of the proposed TEM.
- iv)** Should any revised software or hardware be installed on the TEM, then appropriate user training will have to be carried out by the tenderer at the time of installation.
- v)** The expectation is that the tenderer can provide on-going support to the system users and/or system maintenance personnel via a help desk, or similar arrangement, to maintain the optimal functionality and usability of the proposed TEM.
- vi)** It is expected that comprehensive operational procedures and technical manuals will be provided for the proposed system(s).

## **13) Highly desirable optional item**

Phase plate: It is desirable that the system should be equipped with a hole free phase plate.

## **General terms and conditions:**

- For imported equipment, ICMR general terms and conditions requires that the supply of the equipment has to be made within 90 days from the date of the order but all the vendors have requested to extend the time to 6-9 months (180 days -270 days) in pre-bid meeting. **So, It has been extended as 270 days.**
- **Mode of Payment** : Letter of Credit (LC) - 90% against the shipping documents & balance 10% within 30 days after successful installation & commissioning at user's end and acceptance by the user.
- **Delivery:** CIF (Kolkata) has to be mentioned.
- All other terms & conditions strictly as per terms and conditions of the Tender.

Store in Charge  
**For Director**