UGC-DAE Consortium for Scientific Research
(An Autonomous Institution under University Grants Commission)
University Campus, Khandwa Road, Indore- 452001 (India)
Phone : +91 0731 2361546, 2463913, 2762267 Fax : +91 0731 2361546, Website: www.csr.res.in E-mail:iucstores@csr.res.in

*Item No-1: 200 kV High Resolution Transmission Electron Microscope (HRTEM)*
***Global Tender Enquiry (GTE) 05/2025-26 dated 19-11-2025 due On 19-12-2025***

# TWO PARTS TENDER ITEM

## Technical Specifications for a 200 kV High Resolution Transmission Electron Microscope (HRTEM)

| S/N | Features | Descriptions |
|---|---|---|
| 1. | **Introduction** | Supply, installation, commissioning, performance demonstration and operator's training in respect of the HRTEM consisting of the main instrument, its related accessories, and all software's pertaining to the instrument and its subsystems. The instrument should have TEM, Scanning Transmission Electron Microscope (STEM), Lorentz Lens and Energy Dispersive X-ray Spectroscopy (EDS) measurement set-ups as per the specifications.<br><br>The HRTEM is intended to work primarily with samples for material sciences as well as biological sciences, in order to investigate the microstructure of the nanomaterials and perform chemical analysis using Energy Dispersive X-ray Spectroscopy (EDS). The TEM should be fully digital microprocessor controlled and measurements should be possible in ambient temperature as well as in cryo and higher temperatures with suitable holders.<br><br>Microscope should have the capability to be fully operated remotely & performing complete measurements to minimize the interference from operator and maximize operator efficiency.<br><br>The total microscope height should be less than 12 ft. |
| 2. | **Operating Voltage** | 20 kV to 200 kV (with prefix values & user changeable) to intermittent value in the range [min step size 10V].<br>TEM should be aligned at least at two prefix voltages of 80 kV & 200 kV. |
| 3. | **Electron source** | • High brightness Cold FEG with Probe current ≥14nA or better and Brightness ≥2.4 x $10^9$ A/cm²/sr at 200 kV.<br>• Energy spread should be 0.3 eV or less.<br>• The Cold FEG should have guaranteed Lifetime for 5 years or more. |
| 4. | **Operation Modes, Magnification and Resolution** | **(A) TEM :**<br>**Operation Modes :** Bright Field, Dark Field, High Resolution, Selected Area Electron Diffraction (SAED) and Convergent Beam Electron Diffraction (CBED).<br>**Magnification :** Up to 1Mx or higher<br>**Resolution :** (i) Point resolution ≤ 0.25 nm<br>(ii) Line resolution ≤ 0.14 nm<br>(iii) Information limit ≤ 0.11 nm<br><br>**(B) STEM :**<br>**Operation Modes :** STEM-BF, STEM-DF (16 multi -segmented detector),High-angle annular dark-field (HAADF), Differential Phase Contrast (DPC) for magnetic domain mapping and Integrated DPC (iDPC) for low Z imaging capabilities.<br>**Magnification :** 5 kx - 230 Mx or higher<br>**Resolution :** Point resolution ≤ 0.14 nm<br><br>**(C) Lorentz Microscopy:**<br>**Operation Modes :** Bright Field, Dark Field, Selected Area Electron Diffraction (SAED)<br>**Resolution :** (i) Point resolution ≤ 2 nm |
| 5. | **Lens System** | • Quoted system should consist of minimum two condenser lens, constant power objective lenses, diffraction, intermediate and projector lenses to give best |

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| | | possible image quality with minimalistic distortion.<br>• Image drift in objective lens should be ≤ 0.5 nm /min.<br>• Constant-Power Objective lens to be offered for ultimate stability while switching between different magnifications across various operational modes (TEM/ STEM mode) and accelerating voltages.<br>• All the apertures should be motorized and remotely controllable including while during alignments.<br>• All daily TEM tunings, such as focus, eucentric height, beam shift, condenser aperture, beam tilt pivot points, and rotation center, should be automated for multiuser environment.<br>• The alignment files, which include all the lens settings, can be saved and recalled by the user. |
| **6.** | **Lorentz Lens** | • The Lorentz lens is a lens within the lower pole piece of the objective lens, which should enable to image magnetic structures in field-free conditions.<br>• The magnetic field should be in the range of ± 150 Gauss (± 15 mT) The minimum obtainable magnetic field when "tuning" withLorentz lens should be< 2 Gauss (< 0.2 mT). |
| **7.** | **Specimen Chamber& Stage** | • A minimum Goniometer tilt should be in the range ± 90° or higher.<br>• Maximum specimen tilt angle with a standard double tilt holder should be (α/β)(±35°/±30°) or higher.<br>• The specimen tilt angle for standard double tilt holder should have tilt step <= 0.04°.<br>• Objective Pole piece gap should be ≥ 5 mm for facilitating high tilt studies and in-situ studies.<br>• The stage movements should be:<br>X movement range – 2 mm in total or more<br>Y movement range – 2 mm in total or more<br>Z movement range – ±0.35 mm or more<br>Specimen grid size for sample should be 3 mm.<br>• Microscope should have a fully Eucentric goniometer with all 5-axis motorized movements.<br>• Piezo driven with stage step sizes down to 20 pm |
| **8.** | **$LN_2$ Dewar** | • Specimen stage area should have long-term stability with the anti-contamination $LN_2$ Dewar capable of holding for minimum 4 days or 100 hrs. |
| **9.** | **Vacuum System** | • Electron gun part vacuum should be operated in the ultra-high vacuum range better than $10^{-6}$ Pa.<br>• The vacuum in column should be better than $10^{-5}$ Pa.<br>• The vacuum system of the complete system including gun, column, projection and camera should be completely oil-free. It should include a membrane pump, a turbo-molecular pump; and minimum two ion getter pumps. |
| **10.** | **STEM detector** | • The BF and DF STEM detectors should be multi-segmented having 16 or more segments.<br>• 4 parallel imaging channels should be available to acquire 4 or more simultaneous images from different STEM detectors within a single user interface.<br>• Drift corrected frame integration in STEM mode should be offered.<br>• 4K x 4K STEM imaging should be quoted & supplied.<br>• EDS Elemental mapping in STEM mode should be possible.<br>• Spectroscopic imaging (EDS) in High Resolution STEM mode should be possible. |
| **11.** | **TEM CCD Camera / Viewing Camera** | • High resolution retractable CMOS camera with a pixel of minimum 4K x 4K (16MP) size.<br>• The minimum pixel size should be 14 µm or less.<br>• Camera dynamic range should be 16 bits. |

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| | | • Installed camera should be compatible with the provided HT range of TEM.<br>• Minimum camera speed should be 1 fps on full frame size (4K x 4K) and 25 fps on 512 x 512 in the Imaging mode.<br>• Minimum camera speed should be 40 fps on full frame size (4K x 4K) and 300 fps on 512 x 512 in the Video recording mode.<br>• Drift corrected integration of image frames should be possible.<br>• Video recording in imaging mode (optional). Separate price should be quoted.<br>• Same user interface for both TEM software and camera software is to be provided.<br>• A viewing camera to view fluorescent screen live should be provided. |
| **12.** | **Software/OS** | • Single user interface software package for TEM control, camera data acquisition, STEM imaging, column alignments and EDX analysis is preferred.<br>• Software module consists of fully automated software for aligning and fine-tuning the optics, daily column alignments & tunings.<br>• Software should be capable of image processing, EDX analysis, TEM/STEM imaging and selected area electron diffraction analysis.<br>• System should run on latest operating system window.<br>• Two PC should be provided with TEM software.<br>• Free software upgrade for 5 years should be offered. |
| **13.** | **Future Upgradation** | System should be compatible with future upgradation for EELS hence a retractable CMOS camera should be offered now.<br>System should be compatible with future upgradation for 3D Tomography. |
| **14.** | **Accessories** | • All essential accessories such as air bellows for vibration isolation, chiller and compressor should be provided along with the system.<br>• The complete instrument should have an enclosure including gun, column, projection and camera that moderates the impact from the air pressure waves, air flows, and fine temperature variations in the TEM room. The enclosure should be equipped with multiple doors to provide full access to the instrument modules and the column from any side.<br>• Plasma cleaner for a rapid and effective method of removing contaminants from the specimen and specimen holder – 1 number. It should also be equipped with pumping station for low-temperature TEM holder. |
| **15.** | **Computer for microscope PC** | All control, data acquisition, analysis and diagnostics software loaded and tested on a Latest, branded PC with latest hardware and software configuration should be offered. The PC should have at least 2TB storage memory.<br>A support PC loaded with softwares for the complete data analysis of acquired data should be offered. The PC should be connected with the main PC for data transfer.<br>The TEM PC should have internet port. |
| **16.** | **Sample holders & Accessories** | • Single-tilt Holder - 1 number<br>• Double tilt Holder – 1 number<br>• Double tilt analytical holder – 1 number<br>• One double tilt holder should be hex-screw type.<br>• One low temperature ($LN_2$) holder [separate price should be quoted].<br>• High take off EDX analytical holder - 1 number<br>• A standard TEM sample on 3 mm grid having Gold grid on Graphitized Carbon should be offered. |
| **EDS System for HR-TEM** | | |
| **17.** | **Detector** | • Multiple four in-column EDS detectors integrated with the pole piece having a total active area of 120 $mm^2$ or higher.<br>• EDS detectors should have a total solid angle of 0.9 Sr or higher to the sample. |

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| | | • EDS detectors should be windowless & design should have a shutter protection. |
| **18.** | **Detector resolution** | • Resolution 136 eV or better at Mn Kα resolution.<br>• Total possible counts should be 100 K or more.<br>• High quality EDS spectra with Fiori Peak/background ratio >3000 |
| **19.** | **Detection limit** | • Capability to detect elements with atomic number ≥ 5 (i.e. from B onwards) |
| **20.** | **EDX Software** | • Software should have capability to do frame removal after a certain collection time.<br>• Windows/PC based software which is compatible with TEM operating software.<br>• Qualitative as well as Quantitative Elemental analysis and elemental mapping facility.<br>• Live EDS mapping should be possible & be a part of the system.<br>• The system software should have facility to track and correct the image shift during longer acquisition time required for critical mapping applications.<br>• Capability to add, subtract and otherwise manipulate elemental colour images.<br>• Calibration should be software controlled<br>• EDX software should be integrated with the HR-TEM control software. Imaging and EDX data acquisition should be parallel and in the same software.<br>• Data collection should be with the same TEM user interface software to minimise alignment and data collection time.<br>• Fully automated atomic EDS mapping without operator adjustment of XY position/drift or focus.<br>• EDX software should have post processing modules enabling background correction, pre-filtering, post-filtering, quantification with or without oxygen *etc*.<br>• TEM, STEM and EDS mapping within a single UI. |
| **Installation, Warranty, Training and Services** | | |
| **21.** | (i) Pre-installation requirements such as room size, required power rating, utility requirements –chiller, gases SF6, argon, $N_2$), AC etc. are to be clearly mentioned.<br>(ii) Site inspection and qualification must be performed by vendor's authorized representative, well in advance of system delivery.<br>(iii) The spares for TEM system should be available for 10 years from the date of Installation. | |
| **22.** | Installation, complete interfacing of the system with its subsystems, and commissioning is to be carried out by the vendor's factory-trained engineers. | |
| **23.** | • Onsite Application training for 15 Days after installation should be included in the offer.<br>• An advanced training for two persons at the factory should be included in the offer. Boarding and Lodging during training should be provided by the vendor. | |
| **24.** | All power supplies must conform to the mains supply: 230 ±10 volts, 50 Hz. | |
| **25.** | Compliance statement to each item of this document to be provided along with the technical bid. | |
| 26. | **Warranty** | A complete system (TEM, EDS and all accessories) warranty of 2 year should be included. |
| 27. | Bidder must submit the compliance statement of technical specification and terms and conditions as per annexure attached. Failure to submit the same, Bid may be rejected. | |

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NOTICE INVITING GLOBAL TENDER No. 05/2025-26 dt 19-11-2025 due on 19-12-2025 at 16:00 hrs.

Director, UGC-DAE Consortium for Scientific Research, Indore invites separately sealed bids from eligible bidders for supply of the following:

| **Sl. No.** | **Description of Item**<br>**Two Parts Tender Item** |
|---|---|
| **1.*** | 200 kV High Resolution Transmission Electron Microscope (HRTEM) |
| a. | Detailed tender document can be obtained in person, by post from Administrative Officer-I (Purchase & Stores Section), UGC-DAE CSR, Indore (address given above). The details of the tenders are also available on our website **www.csr.res.in**. Tender document will be available from **20-11-2025 to 19-12-2025 upto 16:00 hrs.** |
| b. | The Tender Document can be downloaded from our website **www.csr.res.in**. |
| c. | Overseas suppliers can participate in the tender directly, provided they do not have Branch Office in India. |
| d. | The item can be shifted in any laboratory of the consortium in the country. |
| e. | Amendments if any, will only be published on our website:www.csr.res.in |
| | Administrative Officer-I<br>(Purchase & Stores Section) |

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| 1. | Tender in sealed cover duly superscribed "Tender No. …. dt…. due on …..for ……. item ……. "Complete with all details, otherwise tender may not be opened/considered. If you are interested to quote more than one items, you shall submit the quotations in sealed cover separately. (*) items as mentioned in the Tender No GLOBAL TENDER ENQUIRY (GTE) No. 05/2025-26 dt 19-11-2025 due on 19-12-2025 at 16:00 hrs must be **quoted in two parts (Part A-Technical and Part B-Financial).** The two parts show separate sealed covers. |
| 2. | Price should be quoted CIP Mumbai & Insurance up to Indore separately (As per INCOTERMS 2010). |
| 3. | Director, UGC-DAE CSR, Indore, reserves the rights of accepting in full or part /not accepting the tenders without assigning any reasons. |
| 4. | The acceptance of tender, will rest with the Director, UGC-DAE CSR, Indore, who does not bind himself to accept the lowest tender and reserves to himself the authority to reject any or all of the tenders received without assignment of any reason. |
| 5. | Delivery and Installation period must be mentioned. (if Installation required) |
| 6. | Liquidated Damages: The penalty for late delivery will be imposed @ 2% per month or a part there of, subject to a maximum of 10% of the total value of the order. |
| 7. | The tender shall remain open for acceptance for a period of 90 days from the date of receipt. |
| 8. | The decision of the Director, UGC-DAE CSR, Indore, shall be final in all the cases. |
| 9. | Director, UGC-DAE CSR, Indore, shall not be liable for postal delays. The incomplete tenders or the tenders received after due date will not be considered. |
| 10. | Quote your offer along with literatures/catalogues, if any. |
| 11. | We are exempted from the custom duty. The custom duty exemption certificate is issued by Department of Scientific & Industrial Research (DSIR), Govt. of India, New Delhi. Customs duty exemption is in terms of Government Notifications No. 51/96-Customs dated 23.07.1996; No. 24/2007-Customs dated 01.03.2007; No. 43/2017-Customs dated 30.06.2017; No. *42/2022- Customs dated 13.07.2022; No. 07/2024- Customs dated 29.01.2024; No. 38/2024 – Customs dated 23.07.2024.* |
| 12. | GST must be quoted separately, if applicable. |
| 13. | No claim for any tax or duty, not stipulated in the tender will be admitted at any stage. |
| 14. | The tenderer should furnish the users list where similar equipment has been supplied recently. |
| 15. | Special care should be taken to write the rates in figures as well as in words. No overwriting be done on the rates and units. |
| 16. | **Arbitration:** "in connection with the present contract shall be finally settled under the Rules of conciliation and arbitration of the International Chamber of Commerce" should be replaced by "between both parties in connection with the CONTRACT which cannot be settled amicably shall be exclusively & finally settled by Arbitration under the rules of conciliation and arbitration of the **"International Chamber of Commerce, Mumbai"** by one or more Arbitrators appointed in accordance with the said Rules. |
| 17. | No deviation from the stipulated terms and conditions will be allowed. Tenders should be unconditional. |
| 18. | The warranty of the equipment should be for 24 months from the date of commissioning / installation. |
| 19. | It will be obligatory on the part of the tenderer to sign on your offer. |
| 20. | Subject to Indore Jurisdiction. |
| 21. | ***The bidder should fully comply with the OM no. F.No. 6/18/2019-PPD dated 23-07-2020 inserting rule 144 (xi) in GFR 2017 by the Ministry of Finance, Department of Expenditure, Public Procurement Division. (fill Annexure-I)*** |
| 22. | N**o advance payment will be made**. |
| 23. | The Performance bank guarantee as per policy of the Government time to time, must be provided till the warranty period. |
| 24. | ***The last date for submission of the tender documents is 19-12-2025 up to 16:00 hrs. Tender will be opened on 19-12-2025 at 16.30 hrs. Tenderer (s) / authorized representative(s) may attend on the opening of the tender bids.*** |
| 25. | ***For Pre-bid: Email : iucstores@csr.res.in till 25-11-2025. AT 11:30 am. UGC-DAE CSR, INDORE*** |

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**Appendix–II**

Annexure to Bid Form: Eligibility Declarations
(To be submitted as part of tender/Technical Bid)
(On company letter head)
(Along with supporting documents, if any)
Tender Document No. DPS/XXXX
Tender Tile: Goods
Bidder's Name: ----------
(Address and contact details)
Bidder's Reference No. ---------- Date: ----------
Restrictions on procurement form Bidders from a country or countries, or a class of countries under Ruler 144(xi) of the General Financial Rules 2017.

"We have read the clause regarding restrictions on procurement form a Bidder of a country which shares a land border with India; and solemnly certify that we are not form such a country or, if from such a country, we are registered with the Competent Authority (copy enclosed). We hereby certify that we fulfil all requirements in this regard and are eligible to be considered."

Penalties for false or misleading declarations:

We hereby confirm that the particulars given above are factually correct and nothing is concealed and also undertake to advise any future changes to the above details. We understood that any wrong or misleading self-declaration by us would be violation Code of integrity and would attract penalties as mentioned in this tender document, including debarment.

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(Signature with date)

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(Name and designation)

Duly authorized to sign Bid for and on behalf of

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(Name & address of the Bidder and Seal of Company)