Central University of Rajasthan

NH-8 Bandarsindri, Kishangarh, Distt-Ajmer-305817
Tel: 01463 – 238755 Website www.curaj.ac.in.

CURAJ/Purchase/Tender/2023-24/653   **Dt. 26.05.2023**

CORRIGENDUM

This has reference to the tenders vide Tender No. CURAJ/Purchase/Tender/2023-24/147/345 dated 26/04/2023 for the supply & installation of Field Emission Scanning Electron Microscopy (FE-SEM) at Central University of Rajasthan.

Technical specifications have been amended for the Field Emission Scanning Electron Microscopy (FE-SEM) as **Annexure –I**

The last date of bid submission extended upto 09.06.2023 at 2:00 PM.
All other terms and conditions will remain same.

-sd Registrar
Central University of Rajasthan

Revised Technical Specification of Field Emission Scanning Electron Microscopy (FE-SEM)

Name of the equipment: Field Emission Scanning Electron Microscopy (FE-SEM)

S.No.	Features	Revised Specification
1.	Electron Gun	• High stability Schottky Field Emission Electron source. • The emitter should be covered under 3 years warranty orreplaced as and when required within 3 years free of cost.
2.	Electron Optics	• Magnetic/electrostatic objective/compound lens or equivalent lens assembly for high-resolution imaging of all types of materials including magnetic samples at lower working distance. • The lens should be thermally stabilized. • Electron channeling contrast imaging (ECCI) should be possible with the supplied optics
3.	Image Resolution	• **0.7 nm or better @ 15 kV in high vacuum** • **1.1 nm or better @ 1 kV in high vacuum** • Resolutions claimed must be supported with pre-printed documents and demonstrate at the time of installation of the Equipment.
4.	Accelerating voltage Or Landing energy	• Adjustable from 20 V to 30 kV or better. Or • Adjustable from 20 eV to 30 keV or better. • All the voltage settings should be varied through software
5.	Probe Current	• **Variable from a few pA to 300 nA or better** • Noise (variation of probe current) should be <1%
6.	Magnification	• Lower mag. 30× or less • Higher Mag. 1,000,000× or more
7.	Vacuum System	• Suitable vacuum systems having Ion getter pump/sputter ion pump, TMP and dry scroll pump for ultra-clean and fast pumping must be provided. All necessary gauges and valves must be included. • **Pump downtime should be 5 minutes or better with or without use of an air-lock system.**
8.	Chamber	• The chamber should have 10 or more ports for variousaccessories. • Integrated plasma cleaner • Infrared chamber scope (IRCCD) for a real-time view
9.	Stage	• All 5 axes fully motorized Eucentric piezo stage or equivalent type with • X = 100 mm or higher • Y = 100 mm or higher • Z = 20 mm or higher • **Tilt from –4° to +70° or better** • Rotation: 360 degrees • Store and recall of sample positions functions to select

		features, center and zoom selected feature, multidirectional stage drive, rotation etc., should be possible through the software.
10.	Sample Holder	• Multiple sample holder to be provided which accommodates different varying sample sizes in the range 1 mm to 20 mm or larger. • Sample holder for STEM imaging
11.	Standard Detectors	• In chamber secondary electron detector • In-lens/In column secondary electron detector or equivalent for high-resolution imaging in high vacuum • In-lens/In column Backscattered electron detector or equivalent for high-resolution imaging in high vacuum • Pneumatically retractable backscattered detector • Low vacuum detector for non-conducting samples
12.	Anti-vibration support:	SEM Chamber and electron gun should have a built-in, fully integrated self-levelling Active Anti-vibration isolation suspension system
13.	Computer system and Printer	• Two computer systems with the latest Windows operating system and all the necessary supporting software for online and offline analysis. • Processor: Intel i7 8700 Core: 6 or more, Intel 8th Generation 3.2 GHz or more, Processor or better RAM: 32 GB or more, Storage: SDD Drive 512 GB + HDD 1 TB, Optical Drive: DVD R/W. • Printer No: 01 (Colour Laser printer with separate toner and drum, Paper size: A4, Resolution 600 × 600 dpi or higher)
14.	Digital imaging, processing and storage:	All possible features in the software supplied must be enabled and ready to be used. Image Display: • 64-bit GUI with Windows 10 or latest version of Windows compatible with the Software of the FESEM, keyboard, optical mouse • 27 inch or better Full HD LED-backlit IPS display flat screen square monitor. • Images should be viewed live, averaged, or integrated. • Scanning at different speeds and modes • Point & Line Scan, Image rotation, Image shift, Tilt compensation. • Standard data zone should include magnification, working distance scale bar and date custom data zone should be possible. ○ Multiple point-to-point and linewidth measurement systems freely adjustable for orientation. ○ Line profile display. ○ Dynamic focusing and image rotation should be possible on the software interface.
	Image processing:	State of the art image processing options with the following capabilities • Design of the imaging and processing should be optimized for field emission scanning electron microscopy. • Image frame size selectable up to pixel density of 4096 × 3536 or better • Frame averaging for up to at least 250 frames. • Line averaging for up to at least 250 lines. • Combination of pixel and frame averaging. • Combination of pixel and line averaging. • Image post-processing. • Multi Detectors Display (MDD): Displaying of up to 4

		live detector signals simultaneously in four frames side by side. • Detector Mixing (DM): Provision for mixing in user-defined ratios & display of different live signals from the same field of view.
	Data Storage:	• Storage of SEM images on a hard disk in standard TIFF, BMP, or JPEG Formats and in 8-bit or 16-bit depth • Operating conditions easily stored and file management through Microsoft Windows operating system.
15.	Auto Functions	• The software should have functions like auto-focusing, drift correction, dynamic focus, auto contrast/brightness etc.
16.	EDS System	The supplier will be responsible for the supply of all the necessary hardware and software to prove field integration of EDS system with the FESEM. • The EDS detector should be easily retractable to a safe position when not in use. • Peltier cooled liquid nitrogen-free Silicon Drift Detector (SDD) with a pulse processor having an active area of $30mm^2$ or larger. • The detectable element range should be from Beryllium (Be) onwards. • EDS detector Energy Resolution of 127eV or better atMn-$k\alpha$, • The EDS detector movement should be software controlled.

17.	EDS Software	The EDS system software should allow the user to use standards to enhance the accuracy of quantitative analysis. The EDS server and analysis software should be capable of performing data acquisition, storing and transfer, multitasking type based on the latest operating system and comprising with monitor, CPU etc. and necessary cables and connectors to link with FESEM.
		It should be able to perform:
		• Qualitative and quantitative spectrum analysis for accurate peak identification, background subtraction and automatic peak evaluation.
		• Deconvolution of spectra for separate element contributions
		• Quantification software must have options for ZAF or similar corrections.
		  • User interactive qualitative and standard less quantification with K, L, M, N line database.
		  • Quantification of elements from Boron in point, Line Scan, Mapping. Real-time elemental mapping with auto elemental identification, quantification based on ZAF or similar correction algorithms. Quantification of phases.
		  • Spectral imaging with up to 4096×4096 pixel resolution, online deconvolution and pseudo color mapping.
		  • Storing of spectrums at each point during mapping for online and offline analysis (1 offline license).
		  • Display of quantitative results as atomic and weight percentage. Color-coded concentration distributions (element maps, phase maps) for any number of elements within an arbitrary field of view.

		• Export of results to MS® Word, Excel and pdf.
18.	Calibration standard samples	• Standard samples to be provided for SEM and EDS.
19.	Sputter Coater system	• **Vacuum pumps (turbo or rotary) and other necessary items are to be provided.** • High vacuum system allows sputtering of a wide range of oxidizing and non-oxidizing metals suitable for SEM, high-resolution FESEM and thin film applications. • Metal Target: Au-Pd to be provided, • 20 set of additional/spare targets is required.
20.	Essential Accessories	• Touch alarm safety detector for specimen stage and detectors. • Remote control hardware & network software for online fault diagnosis using internet TCP / IP open protocols. • All essential commissioning and operating accessories like air compressor, vibration, and noise-free chillers etc., to beprovided. • Essential tool kit to be provided. • Nitrogen gas cylinders with regulators (minimum 2 sets or as many as required for the operations of the Equipment)to be provided.
21.	Spares/Consumables	• **20 nos. of stubs with a single sample and 4 nos. of multiple sample holders, (double-sided conducting carbon tapes, silver paste with thinner for three years of use), 2- tweezers and 2 mount grippers for holding stubs.**
22.	Upgradation	• Up-gradation options for WDXS, Cathodoluminescence,etc. should be available in the equipment.
23.	Low vacuum or Variable pressure	• The microscope must have the ability to image under lowvacuum or variable pressure mode
24.	Warranty/CMC/AMC	• On-site Comprehensive Warranty (from the date of full installation) of equipment for 3 years along with free software upgrades for the entire system including all the attachments. • The warranty shall cover each part of the equipment including parts that are having limited life. • The purchaser is not liable to pay any extra charges on thisaccount during the warranty period. • During the period of warranty, the bidder will ensure at least 2 Maintenance Service per year for the entire period. • Cost for three years (i.e. 4th to 6 years) on-site comprehensive maintenance contract (CMC) should also be quoted separately. • Cost of Annual maintenance contract (AMC) for additional 4 years (ie 07th to 10th years) subsequent to theCMC period, should also be quoted separately.
25.	Availability of spares parts	• The vendor will have to guarantee that all the spare parts for the offered FESEM and attachments will be available for at least the next 10 Years

26.	Documentation	• The vendor should specify the model number of the FESEM and submit the brochure that supports all the quoted specifications. • The vendor should provide the Tabulated format of Compliance Certificate – Indicated Tender Specification, Quoted Specifications, Deviations (if any) and SupportSpecification by Specification
27.	Installation and Training	• Onsite installation, demonstration of all specifications quoted. • The training for users in the operation of the FESEM-EDSat the university after final tests should be included. • During the warranty period, the bidder will ensure 1 training (of 3 days) per year for the duration of warranty atthe University after initial installation.
28.	**Optional items**	**STEM detector:** • Pneumatically retractable STEM detector for BF/DF andHAADF imaging
		EBSD-TKD system • The EBSD-TKD system should work on the same user as that of the EDS system • 70° Pre-tilted sample holder (2 nos.) for EBSD and suitable holder TKD • Camera Speed: 1500 or higher indexed patterns per secondon Ni standard at beam currents of > 2 nA, • Motorized, high-precision camera slide, Touch sensor for collision prevention, Integrated Real (not virtual) Forward Scatter Detector, SEM interface for the camera shouldcontain standard features • EBSD-TKD data collection software includes state of the art features. EBSD-TKD data analysis software (with 3 offline licenses) The EBSD system software should include (i) Data Acquisition Software (ii) Phase Reflector File Creation Software (iii) Pole Figure Software (iv) Mapping Software (v) ODF Software (vi)Imaging and Beam Control Software (vii) Stage Control Software. Should have suitable materials databases for metals, alloys, intermetallic, ceramics and polymers.
30	**Manpower:**	• A qualified technician should be deputed by the vendor for the period of one year from the date of successful nstallation.
31	**Minimum installations**	• **The make and model quoted must have at least 5 installations in Higher Education/ Research Institutions within India**