DEPARTMENT OF CECASE

NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALLI - 620 015

02.04.2014

Minutes of the pre-bid conference

Tender Notification No.: NITT/F.NO:SIF003A/PLAN2013-14 dt: 06.03.2014

Last Date for Submission of tender documents: 16th April, 2014 at 3:30pm

Specification for Field Emission Scanning Electron Microscope:

Sl. No	Original tender specification		Amended specification
1.	Electron gun	Field emission electron source Schottky FEG	No Change
2.	Resolution	1 nm or below at 15 kV and 1.5 nm or below at 1 kV The definition of resolution and the method used to determine the same should be specified. Resolution claimed must be supported by printed literature.	1 nm or below at 15 kV and 1.6 nm or below at 1 kV
3.	Acceleration voltage	≤ 0.1 to 30 kV continuously adjustable	No Change
4.	Magnification	≤25X to 1,000,000X or more. Minimum and maximum magnification should be specified	No Change
5.	Probe current	Suitable for all applications, and should be up to 200 nA or higher.	Suitable for all applications, and should be up to 200 nA or higher. Faraday cup should be included with suitable probe current measurement.
6.	Specimen stage	PC controlled fully eucentric 5 axis motorized stage movements equivalent to X ≥100 mm Y ≥80 mm Z ≥20 mm Tilt = ≥ -3° to ≥ 50° or higher, R = 360° endless Stage movement should be controllable through both computer and manually with joystick.	No Change
7.	Multi Specimen holder	Suitable for loading many specimens (≥ 5) 70 degrees pre-tilt holders – 5Nos. Cross sectional sample holders – 1 no. STEM Holder 1No Stubs 50 Nos	No Change
8.	Detectors	In-chamber SED (Everhart-Thornley).	

		Four quadrant detectors for BSE. In lens/In column Secondary Electron Detector (SED) or equivalent. In-lens/In-column Backscattered Electron (BSE) Detector or equivalent. Angle Selective BSE/ Directional backscattered detector or Equivalent Technology. Pneumatically Retractable STEM with bright field and dark field detectors should have capability of high sensitivity for low kV analysis. Specify built-in automatic/ manual control for contrast and brightness. Option for viewing images from SE and BSE detectors simultaneously on the screen. WDS detector FIB (optional), SIMS(Optional)	WDS detector (must be quoted separately) -Data acquisition facility in the form of ASCII values of the WDS spectra. -Appropriate crystals should be incorporated in the given configuration to cover the elemental range from Be to U -Automatic and fast crystal change should be possible -Rowland circle of diameter 100 mm or greater -The WDS detector should have a mechanism of protection from any kind of damage by contact with specimen or specimen stage. -Additionally P10 gas filled cylinders (2 Nos.) to be supplied. FIB (optional) (Removed) SIMS (Optional) (Removed)
9.	Camera	Camera (IR-CCD) or suitable device to view the samples and stage inside the chamber.	No Change
10.	Non	Should be capable of imaging magnetic samples at higher magnifications similar to	No Change

	conductive samples/Magnetic samples	the non-magnetic samples (details are of magnification and resolution to be provided) System should possess a state of art hybrid lens or equivalent technology to image magnetic materials.	
11.	Vacuum system	Fully automated microprocessor controlled vacuum system comprising of Ion-Pump (for Field-emission SEM), Turbo-Molecular Pump (TMP) (along with water chiller if water-cooled TMP) backed by oil-free rotary pump, pneumatic valves (clarify if any in-built proper safety measures against failure of power supply, vacuum, water-flow, etc. are provided). This system should be compatible for gun and filament in order to protect both Gun/filament against air-exposure of specimen chamber during specimen loading/unloading.	No Change
12.	Scanning/ Display	system - High definition dual display system with 23" LED (1920 X1080) pixel better for high quality image in real time under graphical user interface Color Laser printer	No Change
13.	Sample preparation Accessory	Carbon and gold deposition sputtering unit, Along with the coater, 2 Nos. of extra Gold-Palladium targets and 2 meter of carbon fiber should be provided. Mag. calibration grid, STEM grid, Carbon tapes 50 meters, Holey carbon coated copper grids – 200 Nos and Plasma cleaner to be provided. Silver Paste – 50 grams should be provided. The power requirements and gas requirements of sputter coater must be mentioned in the bid/ offer.	No Change No Change Lacey carbon coated copper grids – 200 Nos instead of Holey No Change No Change Spares kit for Sputter coater for 2 yrs should be quoted along with the tender.
14.	Local charge compensation facility (Optional Item)	Imaging and analysis of non-conductive sample without conductive coating.	Optional, must be quoted
15.	Control System for FESEM	Latest processor, 2 TB HDD, 8 GB RAM, 2 Gb Nvidia graphics card, three years warranty including parts and labor. Windows 7 or higher compatible OS to operate FESEM and all attachments. All the computers for FESEM, EDS-EBSD must be imported /factory fitted and tested with pre-loaded softwares for operating these systems.	No Change
16.	Software	pre-loaded licensed software for total system control, including EHT, lens	No Change

		supplies, scanning conditions, imagining, chamber pressure control, and image. Complete software for image analysis like particle size analysis, 3D imaging, super position of images etc. Image file in JPEG, TIFF and BMP formats. EBSD, STEM, WDS and EDS should be assessed simultaneously using a single user interface.	
17.	User Interface	Operational keyboard with control and adjustment knobs for frequently used SEM parameters (focus, magnification, etc.)	No Change
18.	Energy dispersive X-ray Detector	Latest Integrated FET technology based Peltier Cooled Silicon Drift Detector with a sensor size of 30 mm^2 or higher detector area and resolution of ≤121eV or better Mn Kα @100,000 cps . At the installation site, the detector should also show ≤70 eV at F-Kα and 60 eV ≤C-Kα at 100,000 cps, as per established ISO norms. The detector should have a Super Ultra-Thin Window for better light element performance and capability to detect from Be to U. The software should have capability to do Qualitative & Quantitative Analysis, Peak and Auto ID routine, Spectral Match Analysis, Database management and reporting, Elemental Mapping, Point Analysis, Line Scanning, Real time Phase mapping, Phase to Element and Element to Phase maps with specimen drift correction. Pile up correction and background noise reduction, simultaneous imaging and analysis should be possible. Provision should be there to integrate the quoted EDS system with the EBSD for simultaneous acquisition of EDS-EBSD. The supplier should arrange for seamless interfacing, software, installation and commission for EDS and EBSD systems. Data acquisition facility in the form of ASCII values of the EDS spectra Separate PC and Monitor for EDS should be provided. Specifications for the computer as per the Sl. No 18.	No Change
19.	Electron Backscatter Diffraction (EBSD) Detector	Forward Scattering Detector (FSD) should be provided. Versatile camera with Integrated forward Scatter detector fulfilling the requirement for both high speed and high sensitivity applications, indexing speed of 1000 patterns/sec at 5 nA with 99% indexing success, 99% indexing at 5 KV and 99% indexing at 100 pA to generate high quality data for non conductive and beam sensitive samples also.	No Change

		The high speed EBSD camera should be able to perform scan at a speed greater than 600 fps (frame per second). The EBSD camera should be capable of providing a high pixel resolution, minimum resolution of 640×480 pixels. The EBSD camera should have a high contrast ratio, which is the ratio of the luminance of the brightest color (white) to that of the darkest color (black) that the system is capable of producing. The EBSD system should be capable to pick up minimum angular deviation (i.e. angular resolution) down to 0.1 degree. Orientation precision measurement should be less than 0.1 degree which shows true sample deformation structure to allow understanding of process/property relationship. The camera should be retractable with digital slide control and have a touch sensor alarm, which is audible. The camera should also have a bellow assembly to avoid any vacuum leakage, circular phosphor screen for better sensitivity at edges. The EBSD camera should have a mechanism of protection from any kind of damage by contact with specimen or specimen stage. An alarm facility/indicator may be provided to alert the user if the specimen is about to touch the phosphor screen. -Fully integrated EDS-EBSD set-up in one interface, facility for automatic optimization of camera settings, automatic background collection and subtraction, camera setting match to EDS conditions. EBSD should have highest indexing accuracy and quantified measurement of data quality. Software should include (i) camera optimization for data collection (binning, brightness and gain), (ii) background collection and subtraction, (iii) point analysis (for collection of patterns from multiple spots in a given area. The EBSD software should be able to index all seven crystal systems (metallic, ceramic, semiconductor, minerals and rock samples) , and should include multiple Hough Transform routines as well as ability to optimize parameters for high speed or high resolution indexing requirements.	

		The EBSD software should also have capabilities for dynamic mapping (for producing orientation and phase maps with SEM image with pie charts showing phase and structural information) to ensure data collected matches data needed. The EBSD software should have the ability to collect data from a selected point continuously using the mouse in a manner that each data point is time stamped, allowing the user to go back to any frame collected to select the optimal data point in case of beam sensitive /contamination problems. The EBSD should be able to dynamically adjust the drift correction frequency based on the changes occurring during collection. Beam control and data acquisition software should be included for providing digital control of the electron microscope beam and acquisition of up to two simultaneous videos signals with 16-bit resolution. User-selectable processing times should be possible for allowing collection tailored to application-specific needs. The software should have options for pile-up rejection and reduction of sum peaks. There should be option for choice of 5 or 10 eV/channel resolution for spectral collection to improve overlap deconvolution EBSD off-line Software License (5 Nos.) should include all applications for use on another workstation. The analysis software should have the capabilities for advanced texture analysis (example: ODF calculations by both series expansion and binning), in-grain misorientation analysis, misorientation distribution function (MDF's), Taylor and elastic stiffness analysis at any strain tensor. Software should support analysis of thin films and coatings along with bulk materials. The EBSD camera should have a mechanism of protection from any kind of damage by contact with specimen or specimen stage. An alarm facility/ indicator may be provided to alert the user if the specimen is about to touch the phosphor screen.	
20.	Control panel	Control panel for entire operation of FESEM	No Change

21.	Chiller & compressor	High quality chiller and compressor for FESEM unit; Specify the manufacturer and model. Warranty applicable to chiller and compressor for 5 years for both parts and labor	No Change
22.	Calibration	Standard samples to check system calibration i.e., magnification etc. should be supplied along with the system.	No Change
23.	Standards	Standard samples for day to day analysis and calibration	No Change
24.	Expandability	Provision for attaching additional detectors	No Change
25.	Tools, spares and consumables	Recommended spare kit (complete list should be provided) along with one spare FE-electron emitter sources (to be provided whenever it is necessary within three weeks) and 5 set aperture strips.	Separate quote for FE-electron emitter source
26.	Diagnostic support	Remote diagnostics with internet connectivity with the manufacturer to solve hardware and software issues at site (NIT Trichy).	No Change
27.	Power Backup	15 kVA UPS with 10 hours backup for FESEM, Chiller unit and other accessories	15 kVA UPS with 3 hours backup for FESEM, Chiller unit and other accessories
28.	Environmental control accessories	System to maintain the humidity, room temperature and other necessary parameters for optimum performance of FE-SEM system	Removed
29.	Electron Optics	Beam Deceleration/Gentle Beam/Beam Booster technology or equivalent for high resolution imaging at low kV.	No Change
30.	Chamber	Chamber design should allow changing of the specimens quickly. Chamber should allow up-gradation to in-situ tensile/heating experiments.	No Change
31.	Protection system	WDS, EDS, EBSD, BSE and SE detector s should have a mechanism of protection from any kind of damage by contact with specimen or specimen stage.	No Change
32.	Spares and undertaking for spares	An undertaking that the vendor will supply all the spares and services for the equipment for at least 10 years from the date of commissioning.	No Change
33.	Pre-installation requirements	Pre-installation requirements such as room size, tolerable limits of EM field and vibration (mechanical), required power rating; Utility requirements are to be stated clearly, and to be verified/ surveyed by the supplier at the installation site. It is the supplier's responsibility to clearly provide details of the above mentioned requirements before 120 days of delivery of the equipment.	No Change
34.	Warranty Training and Service Support	Three years comprehensive on-site warranty should be offered for entire offered configuration (after successful commissioning of the equipment). Service response time, turn-around time & up-time of the equipment should be clearly specified. Service response time must be less than 72 hours.	

		Additional two Year AMC without additional cost should be provided after the expiry of three years warranty period. The supplier may provide a highly skilled full time Engineer with suitable expertise for training to designated users and providing technical assistance and routine maintenance of the proposed FESEM for a period of 2-years from the date of installation of the system in the institute. The institute shall have no responsibility for his/her service liabilities. The expenses for such service are to be quoted separately along with technical bid.	The supplier must provide a highly skilled full time Engineer with suitable expertise for training to designated users and providing technical assistance and routine maintenance of the proposed FESEM for a period of 2-years from the date of installation of the system in the institute. The institute shall have no responsibility for his/her service liabilities. The expenses for such service are to be included in the quote.
35.	Compliance Statement	The supplier must submit a table indicating the compliance of the features of the model of the equipment being quoted with those given in the indent. Features not matching – must be clearly indicated. Additional features and features in the quoted equipment which are better than those in the indent – may be clearly explained. The supplier must submit technical brochures and proper application notes adequately explaining and confirming the availability of the features in the model of the equipment being quoted	No Change
36.	Required Documents along with technical specifications	The supplier must provide a comprehensive list of users of FESEM (Schottky Field Emission SEM) in India. They should also submit the name(s) of the service engineer(s) employed by them who is/are competent to service the equipment being quoted with their locations in India.	No Change
37.	Terms and conditions	(a) A single order will be processed for the entire configuration. (b) The firm has to guarantee support for both system and spares for a minimum period of 10 years. (c) Provision for on-line remote diagnosis of faults. (d) The firm must have at least 5 installations of Schottky Field Emission SEMs within India for desired experience of maintenance. (e) Free training on different applications to selected users. (f) Compliance of all listed specifications/terms and conditions sheet should be indicated by the vendors in tabular form. (g) Date of manufacturing of the equipment should be after the placement of	No Change

		order. (h) Break up of price for optional items should be shown separately in the price bid.	
46.	Warranty period required (Years) Page 17 in the tender document	Three years	Three years

Note: Any other accessories apart from the mandatory accessories and systems mentioned above may be quoted separately. Post-installation training expenses should be born by the supplier.

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