Phone: 03229-255246(O) 256221(P)
BELDA COLLEGE
(Affiliated to Vidyasagar University)
Re-accredited & Graded 'A+' with CGPA 3.49 by NAAC
Belda :: Paschim Medinipur :: 721424 :: W.B.

BC/Tender/24-25/1/R **Date: 13.01.2025**

From:
The Office of the Principal,

Tender Notice

Quotations from reputed and experienced Vendors are invited by the undersigned for the following purpose (as per attached schedule).

Quotation to be submitted within 19.01.2025 (2-00 PM) in the office of the Principal, Belda College, Belda, Paschim Medinipur, West Bengal or by email principal@beldacollege.ac.in

Sd/-
Principal
Belda College

Specifications of the recommended instruments for quotations

1) **Fluorescence Spectrometer:** Hitachi Fluorescence Spectrophotometer (Model No: F-7100)
2) **Source Measurement Unit (SMU):** KEITHLEY 200V, 1A, 22 Watt Source Meter + Low-vacuum compatible (up to 10^{-3} mbar) I-V Measurement chamber containing two probes (with X, Y, and Z axis movement), heating stage with controller (up to 300 ℃) and gas flow provision.
3) **High Temperature Tube Furnace:** Two-Zone Split Quartz Tube (diameter ~ 5 cm) Furnace (Should go up to 1400 ℃) + Vacuum System (Low Vacuum, Rotary pump with all accessories) + Digital Pirani gauge with all accessories to connect with the furnace + 1 Non Corrosive Multi Gas Mass Flow Controller (MFC) from Alicat with power supply (0-500 sccm) + gas connections from MFC to tube flange + Extra Calibration Thermocouple and Reader.
4) **Detailed specifications for Gas Sensor Measurement Setup:**

VACUUM TEST CHAMBER: Vacuum chamber fabricated out of non- magnetic stainless steel 304 Grade. Chamber is hemispherical provided with feedthrough for Electrical connections in the base and a Quartz Window on the top side. Chamber will house Substrate Heater with Substrate Holder. Chamber will have Port for 4 Probe Resistivity Measurement and Vacuum Port, Vacuum Release Valve, Vacuum Isolation Valve and spare Blank Ports for future upgradation and other measurements. Chamber will be evacuated to 10^{-2} - 10^{-3} mbar range before purging gas into Chamber and controlled through Valves.

HEATER &TEMPERATURE MEASUREMENT AND CONTROL: A 3" dia Resistive Heater which can work in vacuum as well as atmosphere, Oxidizing & Reducing and condition. Heater can achieve Temperature up to 400 ℃ with PID Temperature Controller. Power to the heaters is smoothly controlled by means of SSR Power controller.

MICRO POSITIONER MANIPULATOR: 4 NOS.: 4 Nos. Micro Positioner Manipulator having X, Y, Z movement of at least 5-10mm with a precision of 0.5mm per turn with Tungsten probe to measure DC Current with magnetic Base. Coaxial Cables with Pogo Pins shoul be provided to connect Manipulators with Source Meter for Parameter Measurement.

SUBSTRATE HOLDER: Alumina Sheet has to be fixed on top of Resistive Heater for sample mounting. This Alumina Plate will have four Electrically Insulated probes to measure specimen, current, resistance etc. from any point across the sample (~30 mm dia) mounted on the heater constant temperature zone. The Electrical Probes should be made of chemically Inert and high Temperature compatible Material which does not lose its stiffness with thermal Cycling. A matching socket has to be provided for electrical connection outside the chamber.

HUMIDITY SENSOR: A Humidity Sensor of high precision should be provided to measure the humidity inside the gas chamber.

VACUUM PUMP: A 250 Ltr./minute Pumping Capacity double Stage Rotary Vacuum Pump.

PIRANI GAUGE (VACUUM MEASUREMENT): A Digital Pirani Gauge with one heads that can measure vacuum range from atmospheric pressure to 1×10^{-3} mbar.

VACUUM PLUMBING LINES CONSISTS OF:

1) 1" Stainless Steel flexible bellow to connect Chamber & Vacuum Pump.
2) 1" manually operated butterfly type isolation valve to isolate the Chamber.
3) 1 No. Manually operated vent valve to vent the chamber.
4) 1 No. Gas Valve to control Flow of MFC to Purge Gas into Test Chamber and Vac. line.
5) Set of Electrical Control, Cables & necessary connectors.

VOC & GAS DELIVERY SYSTEM: Gas Delivery System has two inlet mechanisms VOC and Gas flow.

GAS FLOW SYSTEM: MASS FLOW CONTROLLERS: (3 Nos.)

1 No. Multi Gas MFC for **Carrier Gas (Nitrogen or Dry Air, Flow Rate: 1000 SCCM)** and 1 No. MFC for **Non-Corrosive** (Flow rate: 100 SCCM) for Gases Like, CO, CO_2, H_2, CH_4, O_2, N_2, O_2. Argon etc and 1 No. MFC for **Corrosive Sample Gas Like NH_3** (Flow rate: 100 sccm). Combination of MFCs will be selected in such a way that Sample Gas concentration can vary upto 10 PPM Level. MFCs will be integrated into system and Interfaced with Gas mixing Software controlled by Computer. These MFCs are Programmable from Front Panel or through Computer. 1 No. MFM for **Non-Corrosive** (Flow rate: 100 SCCM) will be provided in the Outlet of the Chamber

TECHNICAL SPECIFICATIONS OF MASS FLOW CONTROLLER:

Flow Range: Selected in such a way that Sample Gas concentration can vary upto PPM Level.

Medium: Ar, N_2, H_2, O_2, CO, CO_2, etc. (Single MFC can be used for upto 30 Gases)

Maximum Inlet Pressure: 9.9 bar

Operating Range: 0.5% to 100% Full scale measurement

Accuracy: ± (0.8% of reading + 0.2 % of full scale)

Repeatability: ± 0.2% Full scale

Typical response time: 100 Milliseconds (Adjustable) or less

Warm up Time: less than 1 second

Resolution: 0.01% of F.S

Operating temperature: -10°Celsius to +50°Celsius

Humidity Range: 0 to 100% Non-Condensing

Input/output Signal Analog Mass Flow 0-5 Vdc/0-5 Vdc

Input /Output Signal Digital Display: Mass Flow Rate, Volumetric Flow, Pressure & Temperature

System connector: RS-232 Serial

Power Supply: 100-240 VAC to 24 VDC Power Supply

MFC sgould be pre-calibrated for the following gases and gas mixtures:

Acetylene, ***Air***, ***Argon***, iso-Butane, normal-Butane, ***Carbon Dioxide***, ***Carbon Monoxide***, Ethane, Ethylene, ***Helium***, ***Hydrogen***, Krypton, ***Methane***, Neon, ***Nitrogen***, ***Nitrous Oxide***, ***Oxygen***, Propane, Sulfur Hexafluoride, Xenon.

Important Requirements: Calibration Certificate will be provided with Mass Flow Controllers.

MASS FLOW CONTROLLER GAS MIXING & FLOW VISION SOFTWARE:

Gas Mixing & Flow Vision Software Model FlowVisonMX / FlowVisionSC is required for Gas Sensing Set up. Mixing Software will be Loaded in Computer/Laptop.

GAS MANIFOLD: A Gas Manifold for purging 3 Gases and VOC is connected to Chamber with NRVs, Swagelock Type Manual Connectors to connect with Cylinders through Regulators.

COMPUTER OR LAPTOP: Processor, i5, Gen10, 8 GB RAMS, 250 SSD or 1Tb H/D, and 15 Inch Display with **Gas Mixing & Flow Vision Software should be provided.**

AUTOMATION: A Desktop with Automation Software to control MFCs, Source Meter etc. must be be provided along with system to control Gas Flow and record IV characteristics etc.

PROGRAMMING INTERFACES SUPPORTED: USB, RS232, Ethernet or GPIB or TSP.

5) **Biological Safety Cabinet:** Air filtration: BSCs should have a HEPA filter with at least 99.99% efficiency. Airflow: BSCs should have a minimum inflow velocity of 0.45 m/s (90 FPM) and a downflow velocity of 0.30 m/s (65 FPM). Air recirculation: BSCs should have 70% recirculation and 30% exhaust. Noise level: BSCs should have a noise level of less than 65 dba. Particle retention: BSCs should have a particle retention of 0.3 microns. LED indicator: BSCs should have an LED indicator to show filter loading. Stand: BSCs should have a fixed or adjustable height stand. UV light: BSCs should have UV light.
6) Hitachi UV-Vis Double Beam Spectrophotometer UH-5210
7) Olympus Fluorescence Microscope (Cx43+EPI led+MU2)