

## TECHNICAL SPECIFICATIONS:

### Closed Cycle Refrigerator-based cryogen free probe station for IV, CV, optical & Electro-optical Measurements of thin Film devices and bulk materials

Quotations are invited for Closed Cycle Refrigerator (CCR)-based cryogen free probe station system optical and electrical measurements with following specifications.

- 1) Closed cycle Refrigerator-based cryogen free cryostat system for electrical, optical and electro-optical measurement with sample in vacuum should be provided with the following specifications.
- 2) Specimen stage should accommodate 15 ×15 mm to 20 × 20 mm<sup>2</sup> or larger thin film and bulk samples
- 3) Sample mount and the Four Probe for electrical connections for sample holder with at least 4 adjustable probe tips position (4 to 6 mm) should be provided on the Sample stage. General-purpose tips (tungsten probes) should be included. Appropriate window to electrically isolate the sample should be provided. 10 pin electrical wiring connection should be provided; Electrical isolation for low leakage measurements; 10 spare probes should be provided. Additional sample mount or stub which can be easily replaced on the cold head for mounting the specimen and making electrical contacts using adjustable tips outside the cryostat should be provided.
- 4) Closed cycle refrigerator (CCR) should preferably cool the cold head to  $\leq 10$  K (base); The system should include
  - preferably a two-stage cold head.
  - Provide a pair of sufficiently long (10 feet) supply and return gas lines, long cold head control cable.
  - compressor with full charge of high-purity helium gas
  - If the compressor requires water chiller, an appropriate compact water chiller should be provided with temperature monitoring provision.
  - Outer vacuum shroud with electrical feedthroughs, evacuation valve, and safety pressure relief valve
  - Cold finger with 1.50" diameter copper sample mount, 50 ohm control heater, and standard curve silicon diode temperature sensor
  - Standard optical sample holder, a heater, and a temperature sensor.
  - temperature control in the range of 10 K to 325 K
  - **Temperature controller** should feature two independent diode / resistor input channels; Two independent heater output loops (1st loop 50W max, 2nd loop 25W) max, or 1st loop 75W max, 2nd loop 1W max); Autotuning PID, audible and visual alarms, and relays; USB and GPIB (IEEE-488) parallel computer interfaces; Cable to connect to cryostat. Power Requirement for temperature controller: 240 VAC, (+6%, -10%), 50 Hz
  - Highly polished aluminum optical radiation shield mounted on first stage
  - Standard optical vacuum shroud including 3.75" square window block with four (4) 1.63" diameter clear view, o-ring sealed, fused quartz windows
  - Instrumentation skirt with one (1) 10-pin electrical feedthrough for heater and temperature sensor wires, three (3) blank feedthrough ports, evacuation valve and safety pressure relief valve
  - Gold plated OFHC copper optical sample holder with tapped hole for temperature sensor.

- 5) Temperature stability: 15 K to 350 K with accuracy of  $\pm 0.1\text{K}$  or better.
- 6) One integrated temperature controller for monitoring all parameters.
- 7) Appropriate radiation shield for electrical, optical and electro-optical measurement should be provided to achieve lowest temperature.
- 8) Vacuum at base temperature less than  $1 \times 10^{-5}$  Torr. Turbomolecular and backing pumps should be provided with the cryostat.
- 9) Vibration at sample stage should be below few micrometer (please provide details)
- 10) Temperature sensors for sample stage/cold head.
- 11) Power requirements: 230/240 VAC, 1 Phase, 50 Hz
- 12) Preferably the system should reach the lowest temperature in 75 min or at shorter time.
- 13) Cold Head should have a recommended maintenance interval  $\geq 10,000$  hours, and the Compressor should have a recommended maintenance interval  $\geq 30,000$  hours.
- 14) Require tools like wrenches and operating manual should be provided
- 15) Warranty 2 years.
- 16) Vendor/OEM should quote for required spares / consumables to run the equipment at least 5 years as optional items.
- 17) The complete setup should be installed at IITM and demonstration should be carried out at site.**

Other Requirements:

- **List of Minimum 10 installations in India should be provided.**
- After sales support should be available locally with service engineers.
- **A detailed technical compliance statement should be provided for all technical specification.**
- **Installation and commissioning: The complete setup including the CCR, vacuum pumps, chiller and other components should be installed and operation of equipment with the above-mentioned specifications should be demonstrated. The offer must include onsite installation and commissioning of the complete setup and all its components along with onsite training of the operators. Final performance test should be conducted after commissioning the equipment in the lab.**

**Optional Requirements:**

- 18) Optics to make contact for small devices can be quoted: Zoom 70 microscope: 7:1 zoom, color CCD camera, swing arm, and video monitor - Sample illumination: coaxial and ring light from an adjustable light source and power supply;