**INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**
**MATERIALS MANAGEMENT DIVISION**
**Powai, Mumbai 400076.**

Ref. PR No. 1000051719 RFQ. No. 6100002536

Item Description: **Magnetron Sputtering system (Set-up)**

| Sr. No | Item Description | Detailed Technical Specification | Technical Compliance (Yes / No) | Additional Information (if any) |
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| 1. | **Magnetron Sputtering system** | **System specifications for PVD (Sputtering) system**<br><br>**(1) Chamber Specifications**<br>• Preferably, a square- or D-shaped vacuum chamber made with SS 304 (or better) with external water cooling.<br>• The chamber should have internal dimensions that accommodate a variable source-to-substrate distance to achieve uniform deposition on the substrate, depending on the target (hollow cathode or disc cathode).<br>• Should have a hinged front-opening door for loading and unloading the substrate.<br>• A set of removable stainless-steel liners (installed inside the chamber) should be provided to prevent deposition on the chamber walls.<br>• The chamber should sustain a built-in leak-check process.<br>• The chamber should have suitable ports for a Turbo molecular pump, vacuum gauges, a vent valve, a roughing valve, an isolation valve, etc.<br>• The chamber base plate should accommodate (with the necessary feed-through ports) mounting for the magnetron sources, source shutters, gas feedthroughs, etc.<br>• The Chamber top plate includes the necessary feed-through ports for the substrate holder.<br>• A port for future expansion or needed for the load lock chamber with a cassette holder (minimum six substrates) should be provided. | | |

(2) **Specifications for Substrate holder**

- The substrate holder platform and the associated fixture should accommodate a 120 mm x 120 mm substrate.
- A rotary drive mechanism for the continuous rotation of 360° with adjustable speed from 1 rpm to 20 rpm should be provided.
- A substrate heater with IR should be provided to heat the substrate from room temperature to 300 °C.
- Substrate cooling system to lower the substrate temperature from RT to -30 degree centigrade.
- Temperature measurement using 'K' type thermocouple or Pt RTD. The temperature should be controlled using a globally recognized PID controller (e.g., Eurotherm or substantially equivalent). The temperature should be computer-controlled.
- A provision for a DC-biased Cu mesh should be provided. A computer-controlled separate DC power supply (Globally recognized, e.g., Keithley, Keysight or equivalent, 0-300V, controllable with 1V resolution) should be provided.
- Linear Z movement should be provided.
- Pneumatically controlled (through software), with an optional manual operation, a substrate shutter should be provided.
- A provision for the cassette should be provided for future upgradation.

(3) **Vacuum pumping system**

The following pumping systems will be provided by the user: (a) One number Dry Scroll pump (20 $m^3$/hr) and (b) One number Turbomolecular pump (700 lps)

Alongside, the user will also provide (a) one Penning gauge and (b) two Pirani gauges.

(4) **Deposition sources**

- Globally recognized make magnetrons (2 numbers), 3 inches or better, capable of uniform coating across the specified substrate area. These magnetrons should be water-cooled and capable of longer operation/deposition.
- A suitable hollow cathode from Angstrom Science will be provided by the user.
- The design should be suitable for depositing materials with +/- 2% uniformity across a 10X10 cm2 substrate. An electrically (DC)

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| | | biased Cu mesh should be on top of the cathode. The manufacturer should consult the users for the final design.<br>• Each source should be provided with an electro-pneumatically operated source shutter.<br>• A water flow switch should be provided with a safety check.<br>• Barthel made RF Power Supply (1 numbers) solid-state 13.56 MHz, 300 W with the auto-matching unit (1 numbers) will be provided by the user.<br>• Power supply should be computer/recipe controlled.<br><br>**(5) Programmable Logic Controller (PLC) for Full Automation**<br>• Automates vacuum and deposition cycles, integrating all critical instruments (vacuum<br>• gauges, power supplies, etc.).<br>• Ensures fail-safe interlocks, preventing process failures due to improper sequencing or<br>• malfunctions.<br>• 15" Industrial Touch PC for easy operation and visualization.<br>• Windows 10 OS, Intel Core i7 processor, 16 GB DDR3 RAM, 1TB HDD for smooth operation.<br>• Mounted on the front panel of the control console, providing easy access and reducing clutter.<br>• Fully Automated, Software-Controlled System<br>• Windows OS-based SCADA software with Graphical User Interface (GUI).<br><br><u>The system can be operated in the following modes</u><br>• AUTO mode with recipe programming for automatic deposition<br>• COMMISSIONING mode [Manual Mode with safety interlocks]<br>• SERVICE Mode [Without interlock; multi-level password protected]<br>• Data logging in SQL database (open format for easy access and analysis).<br><br>**"Factory acceptance test"**<br>Reaching ultimate vacuum ~ 5 X $10^{-7}$ Torr<br>Reaching vacuum 2 X $10^{-6}$ Torr in 30 min.<br>Deposition control: Tested for NiO sputtering.<br>Thickness Uniformity: +/- 2% | | |

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| | | Complete training for the IITB personnel and operation maintenance manual. On-site inspection by buyer. All the expenses to be covered by the supplier for the visit.<br><br>**Warranty:** 1 year on the entire set-up | | |