Prof. N. Satyanarayana,
Principal Investigator – DST-NANO MISSON
Department of Physics,
Pondicherry University,
Puducherry 605 014
E-mail: nallanis2010@yahoo.com

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Name of the equipment: **FIVE TARGETS MAGNETRON SPUTTERING SYSTEM**
Detailed specifications:
The High Vacuum Compatible Five Target Magnetron Sputtering System for depositing Metals, semiconductors, Insulators by DC and RF, for serial and co-sputtering, are suitable for Research and Development as well as small production.

Main features of the system are**:**

1) ALL PARTS SHOULD BE MADE BY **SS 304L** CONSTRUCTIONS OF VACUUM CHAMBER, VALVES AND VITON 'O' RINGS AND GASKETS

❖ **VACUUM CHAMBER:**

- Cylindrical vertical 400 mm diameter x 400 mm height
- All SS 304 L construction
- Complete DC and RF compatible structure for serial and co-sputtering
- Electro-polished from inside and glass bead blasted from outside.
- TIG welded Stainless Steel C-Channel for water cooling of chamber
- 4" window for plasma viewing
- Helium leak tested for leak rates better than 1×10^{-9} Torr lit/sec.
- HV Compatible Glass View port with RF Shield and Shutter for Plasma Viewing
- Removable Top Plate Assembly with Magnetron Mounting
- All Stainless Steel Inner Removable shields

❖ **VACUUM VALVES:**

i) **Roughing Valve:** 1 no.

- Right Angle Bellow Sealed
- ISO KF 40 Compatible

- Electro pneumatically Operated
- Microswitch for OPEN/CLOSE indication and Feedback
- Roughing Valve interlocked with Chamber Pressure

ii) **Backing Valve:** 1 no.

- Right Angle Bellow Sealed
- ISO KF 40 Compatible
- Electropneumatically Operated
- Microswitch for OPEN/CLOSE indication and Feedback

iii) **High Vacuum Valve:** 1 no.

- SS Gate type Valve
- ISO 100K Compatible
- Electropneumatically Operated
- Micro switch for OPEN/CLOSE indication and Feedback
- Interlocked with chamber Vent Valve

iv) **Throttle Valve [Butterfly type]**: 1 no.

- ISO 100 K
- Stepper Motor Control and position indicator.
- PID controller for Downstream closed loop Pressure Control in conjunction with Capacitance Gauge

v) **Chamber Vent Valve:** 1 no.

- Straight Through/Right Angle Valve
- SS Bellow Sealed
- ISO KF10 Compatible
- Electropneumatically Operated
- Micro switch for open indication and Feedback

❖ **<u>SPARE PARTS</u>:**

- All O' rings / gaskets and seals 1 set
- Fuses and switches 1 set
- Turbo Molecular Pump oil 1 charge

❖ **GAS FLOW MANIFOLD:**

a) Mass Flow Controllers (Make: **MKS or EQUIVALENT)**

Argon – 0 – 100 sccm	1 no.
Oxygen – 0 – 100 sccm	1 no.
Nitrogen – 0 –100 sccm	1 no.

b) Control Electronics with set point control and digital display of Flow rate in sccm

c) Gas Inlet Valve (Isolation) - 1 no.
   - Right Angle 'O' ring sealed
   - Electro pneumatically Operated
   - ISO KF 10 compatible
   - Micro switch for OPEN indication and interlock

d) Gas Mixing Chamber and all SS Tubing with Swagelock compatible fittings

2) MAGNETRON SPUTTERING CATHODE ASSEMBLIES SHOULD BE WITH RARE EARTH MAGNETS AND DC/PULSED DC/RF COMPATIBILITY

❖ **<u>MAGNETRON CATHODE ASSEMBLY</u>:**

- 2" Magnetron cathodes assembly in Sputter Down configuration 5 nos. (1 no. for metal + 1 no. for Anode + 1no. for Electrode + 1no. for Lithium based compound as an Electrolyte + 1 no. for Insulation as a protective layer)
- Suitable Geometry for sequential sputtering of five targets without breaking the vacuum
- RF / DC / Pulsed DC compatible
- Integrated gas inlet assembly to provide uniform erosion
- High Target utilization
- All Stainless Steel Integrated Shutter Assembly [Electropneumatic / motor based]
- Microswitch arrangement for Target identification for Power Supply
- Water Flow Switch Interlock for each target.
- Cross Contamination Shields to avoid deposition in between cathodes (Isolation chimney)

3) SHUTTER CONTROL ON SUBSTRATE / TARGET TO AVOID CROSS CONTAMINATION

❖ **<u>SUBSTRATE HOLDER AND ROTATION</u>:**

- Substrate holder assembly to accommodate 1 substrate of 1" x 1" size. To be coated in sputter down mode
- Fixture can accommodate smaller sizes of irregular shapes.
- Substrate holder isolated from ground for bias facility
- Integrated Ar gas Inlet Assembly
- Substrate rotation facility with speed 0 - 20 - 30 rpm
- Heating and Cooling cannot be done simultaneously

❖ **SUBSTRATE HEATING SYSTEM:**

- High Vacuum Compatible Quartz lamp based Substrate Heater construction
- Water cooled Gold coated SS Reflectors
- Thyristorized Heater Power Controller
- PID Controller with Digital Display of substrate temperature from 25-300°C[± 1°C]

4) CAPACITANCE GAUGE WITH DOWNSTREAM CLOSED LOOP PRESSURE CONTROL ELECTRONICS FOR PRECISE PRESSURE CONTROL DURING SPUTTERING

❖ **VACUUM GAUGES**

- Pirani Gauges 1 no.
- Cold Cathode Gauge (IKR 251 or Equivalent) 1 no.
- Gauge Controller with digital display with set point control
- Capacitance Manometer Type Gauge (0.1 m bar range) along with PID Controller for Closed Loop Pressure Control

❖ **PRESSURE CONTROL:**

Down Stream Closed Loop Pressure Control consisting of**:**

- PID Controller (soft PID in Automated Machine)
- Stepper Motor Control Electronics (with Embedded Control)
- Direct Indication of Set and Process Value

5) HIGH VACUUM COMPATIBLE QUARTZ LAMP BASED HEATERS ALONG WITH PID CONTROL AND THYRISTORIZED POWER CONTROL FOR PRECISE TEMPERATURE MEASUREMENT AND CONTROL

VACUUM PLUMBING:

- All SS Hoses and ISO standard Fittings

6) TURBO MOLECULAR PUMPING SYSTEM TO PROVIDE FAST INITIAL PUMP DOWN, CLEAN VACUUM AND GOOD THROTTLING FOR PROCESS PRESSURE CONTROL

❖ **TURBO MOLECULAR PUMP:**

- Model HiPace 400
- Pumping 350 liters/sec [Nitrogen]
- Controller along with digital display
- Splinter Shield with Inlet ISO 100K flange

7) DRY PUMP FORELINE TO PROVIDE CLEAN OIL FREE PUMP DOWN

❖ **DRY PUMP:**

- Model D3
- Direct Driven
- Pumping Speed - 510 litters/min

8) RF AND DC ALONG WITH PULSED DC POWER SUPPLIES FOR SPUTTERING BOTH METALS AND INSULATORS

❖ **POWER SUPPLIES:**

(1) **RF. Power Supply:**

- i) RF Generator (Make: **DRESSLER/HUTTINGER**) 1 no.

ii) RF Power: 300 Watt
iii) 13.56 MHz
iv) Incident Power and Reflected Power Indication

- i) RF Matchbox† (Make : **DRESSLER/HUTTINGER** or equivalent) 1 no.
  ii) RF Power: 300W
  iii) 13.56 MHz

- 4 RF Switch with Isolated Motorized Selector and Microswitch for Target Indication

(2) **Pulsed DC Power Supply:** 1 no.

- Power 1000W
- DC or Pulsed DC Modes of Operation
- Voltage 800 V max,
- Current 3 Amp [max.]
- Frequency [0-30 KHz]
- Duty cycle counter (in pulsed mode) 10% - 90%
- Arc count and short circuit protection
- Unique Arc Suppression Circuit
- All interlocks with indication.
- Remote indication of voltage, current, frequency and duty cycle

9) DIGITAL THICKNESS MONITOR WITH CLOSED LOOP SHUTTER CONTROL THROUGH PLC

❖ **DIGITAL THICKNESS MONITOR WITH QUARTZ CRYTAL SENSOR**

- Model: SQM 160 1 no.
- Dual Sensor head SH102 1 no.
- RS 232 Interface
- Sensor SH-102 with cooling facility

10) RANGE OF INTERLOCKS FOR OPERATOR SAFETY .

11) ALL CRITICAL ELECTRICAL COMPONENTS SHOULD BE CERTIFIED

12) MAIN FRAME should be:

- Chamber Support Frame of epoxy powder coated mild steel material
- All interlocks for safety operation
- Electrical overload protection

- Chamber closed interlock
- Compressed Air failure
- Emergency stop
- Single Phasing Preventer

Also quote the price for the above configuration with diffusion pump.

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