

TECHNICAL SPECIFICATIONS - Sputter Coating System

System Description: This system will be used for sputter coating of metallic, dielectric, and semiconductor thin films used in semiconductor, optoelectronic, sensor, and coating technologies under vacuum using RF and DC power sources. The system will be multi-target, fully automated, and software-controlled.

1. GENERAL REQUIREMENTS

- The system must be compatible with at least a 4" wafer.
- The system must be capable of operating with both RF and DC sources.
- Simultaneous connection to a minimum of four separate targets must be provided, and automatic switching between processes must be possible.
- Automatic gas control, vacuum adjustment, and recipe-based process control must be provided.
- Installation, commissioning, and training must be provided by the contractor.

2. TECHNICAL SPECIFICATIONS

2.1 Vacuum Chamber and System Chassis

- The vacuum chamber front cover must be easily accessible from the inside of the vacuum chamber.
- A removable stainless steel liner must be provided for the internal surfaces.
- An observation window and a shutter system (separate for sources and sample) must be equipped.
- The vacuum chamber must be suitable for heating to at least 120°C for outgassing.
- Preferably, at least two empty ports must be provided for future connections.
- The vacuum chamber must be equipped with a calibrated pressure relief valve to protect against overpressure. (Safety Relief Valve) must be equipped.

2.2 Vacuum System

- The turbo pump must have a capacity of at least 700 l/s.
- The primary pump must be dry-type and have a capacity of at least 30 m³/h.
- The final vacuum must be at least 5×10⁻⁷ mbar.

2.3 Plasma Pressure and Gas Control

- A motorized butterfly valve and a high-precision capacitive sensor must be used for pressure regulation.
- The gas supply must have at least three MFC (Ar, N₂, O₂) structures, each with full range and accuracy of ±1% or better.
- Automatic and manual gas inlet valves must be available.

2.4 Sputter Cathodes and Power Supplies

- Four magnetron sources must be suitable for a target diameter of at least 2".
- Each source must include a gas shower ring that ensures uniform gas distribution across the target surface, along with a shutter and independent water cooling line.
- The RF Power Supply must be at least 300 W, 13.56 MHz, with an automatic matching network.
- DC and Pulsed DC Power Supplies must be capable of providing output power up to 1 kW.
- The Pulse Frequency must be capable of operating at 10-120 kHz.

- The RF/DC selector switch (1 input/2 output) must be PLC-controlled.
- Co-sputtering must be possible using two DC sources.
- Co-sputtering must be possible using one DC and one RF source.
- Reactive sputtering must be possible using O₂ gas.

2.5 Thickness Measurement System

- The system must have a thickness monitoring system for the deposited thin films.
- 6 MHz gold-plated crystals must be equipped with water-cooled sensor heads.
- Thickness monitoring and shutter control must be integrated into the recipe.

2.6 Substrate Area and Heating

- The rotating substrate table for a minimum of 4" wafer should have an adjustable speed between 0 and 30 rpm.
- The wafer/sample temperature should be controlled to 800°C, with a PID control and a maximum deviation of $\pm 1^\circ\text{C}$.

2.7 Electrical Cabinet and Software

- It should have a touchscreen and PLC control.
- Automatic vacuum, gas, temperature, and film thickness management should be possible.
- At least 100 different recipes should be able to be written, each containing at least 50 steps.
- User-defined.
- Data recording (CSV/log) capability should be available.
- An emergency button should be located in the operator area.

3. PERFORMANCE CRITERIA

- The base vacuum should be $\leq 5 \times 10^{-7}$ mbar.
- Film thickness deviation should be no more than 5%.
- Heating temperature deviation should be no more than $\pm 1^\circ\text{C}$.

4. WARRANTY AND SERVICE

- The system must have a minimum 24-month warranty.
- Technical support (spare parts and labor) must be provided for 10 years.
- In the event of a malfunction, documentation must be provided confirming that remote support can be responded to within 2 days, and on-site support within 10 days.
- Training and installation services must be included in the offer.

5. DELIVERY AND TRAINING

- Device installation, testing, and initial user training must be provided by the contractor. Post-installation on-site training must be at least 2 days.
- Delivery time must not exceed 10 months.
- Training documentation, user manuals, and maintenance documentation must be in Turkish and/or English.