Normandale Community College
Request for Bid

REMOTELY ACCESSIBLE SPUTTER DEPOSITION EQUIPMENT TRAINER (RASDET)
SPECIFICATIONS

Bid Deadline: Tuesday January 7, 2020 – 3:00PM CST

Deliver bids to:
Cindy Ladd / Purchasing and Contract Supervisor
Normandale Community College
9700 France Ave. South, Room F2335
Bloomington, MN 55431

These specifications describe the minimum acceptable quality and/or performance level of the equipment to be purchased. “Purchaser” will be used to describe the party purchasing the equipment. “Factory” will be used to describe the party manufacturing the equipment.

A. GENERAL SPECIFICATIONS

1. Equipment Description:
   a. This specification is for a remotely accessible sputter deposition system capable of sputtering conductive and non-conductive thin films.
   b. The system will be used for instructional purposes where students, locally and from remote sites, will be able to operate the system to deposit various thin film coatings. All system component operation will be accessible through a PC interface (HMI).
   c. The deposition system will be comprised of 2 sources, DC sputtering and RF sputtering, which will allow the students to vary deposition techniques with a variety of materials to create thin films with a wide range of properties.
   d. The system will have a flexible architecture that will allow for future enhancements.

2. Operating and Service Manual
   a. The system will include (1) electronic copy and (1) hard copy of the operating and service manual.
   b. Each manual shall contain installation, operation and maintenance procedures, detailed flow schematics and complete electrical drawings.
   c. Each manual shall also contain a complete list of spare parts.
3. **Shipment**  
   a. The factory shall ship the equipment no later than 120 days after the receipt of a purchase order.  
   b. Terms are FOB Destination

4. **Acceptance Test**  
   a. Within 30 days after equipment delivery, the acceptance test shall be initiated.  
   b. The acceptance test shall consist of checking the equipment for compliance with the requirements listed above and with those listed under “Physical Specifications” and “Performance Specifications”.  
   c. If the equipment does not meet the specifications listed, the factory will have an opportunity to repair or replace the equipment to cure all defects.  
      i. The equipment will be returned to the factory freight collect.  
      ii. The factory will have 30 days after the original receiving date or 30 days after being informed of any defect (whichever is later) to deliver acceptable samplers.  
      iii. The factory will be responsible for repair of all defects whether or not the purchaser initially declared the defects.  
      iv. After correction of the defects by the factory, the acceptance test shall be completed in less than 30 days after the receipt of the repaired equipment.

5. **Payment**  
   The invoice will be submitted when the system is delivered and received at its destination. Payment of the final invoice will be due within 30 days of the completed acceptance testing.

6. **Warranty**  
   a. The factory shall provide a written warranty covering the equipment including components, parts, and field service.  
   b. The warranty period shall be one year and shall begin on the date of acceptance.  
   c. In the warranty the factory shall agree to the following conditions:  
      i. Factory is not liable for any indirect or consequential damages  
      ii. Factory is not liable for any event which exceeds the amount paid by purchaser for the products described in this document  
      iii. If failure of the equipment occurs during the warranty period, and application of routine troubleshooting procedures described in the operating and service manual identifies a malfunctioning component or part, the factory shall ship a
replacement component or part at no cost, and within 72 hours of notification.

iv. In the event equipment develops a malfunction during the warranty period which cannot be solved by application of routine troubleshooting procedures described in the operating and service manual or by component or part replacement, the factory shall send trained service personnel to repair the equipment at the original delivery point. The purchaser shall have the option of returning the equipment, at factory’s expense, to the factory’s repair facility. In either case, the factory shall deliver the equipment to the purchaser within 21 days after the initial date of notification, or provide operational, equivalent equipment within the same 21-day period, for use as a substitute until the original equipment has been repaired.

v. The factory shall guarantee all replacements parts to be of equal or superior quality to parts in the original unit.

vi. The factory shall pay for the shipment of replacement or defective components, parts, or equipment to and from the factory’s repair station during the applicable warranty period.

7. Factory Acceptance Test:
   a. Prior to delivery, the purchaser has the option to view the system in operation at the factory location or virtually through the remotely accessible interface. Any travel expenses incurred will be the responsibility of the purchaser.
   b. The system is factory tested to comply with the manufacturer’s system performance.
   c. The purchaser will be supplied with the manufacturer’s system performance specification.
   d. The purchaser will be supplied with applicable testing documentation.
   e. No process guarantees of any kind are offered or implied with the system.

8. Training:
   a. Training will be included as part the start-up, commissioning and acceptance testing at the purchaser’s site. This training will include, but is not limited to, the following topics: system operation, maintenance and troubleshooting.

B. PHYSICAL SPECIFICATIONS

1. Process Chamber:
a. Process Chamber Geometry: Horizontally Oriented, Cylindrical 304L Stainless Steel
b. Chamber Body: 15.13” Diameter x 16.25” Overall Length (OAL)
c. Process Chamber Construction: 304L Stainless Steel
d. Cabinet Construction: Carbon Steel, Fully Enclosed Instrument Rack, Open Chamber Area, Gray Powder Coat Finish
e. Removable and reconfigurable top and bottom plates on ISO 250 ports (10" tube)
f. Glovebox mating provisions
g. Spring-loaded, pendulum style, full-access, aluminum front door
h. Appropriate pumping, process, gauging and instrumentation ports are included
i. Two (2) viewports included in the chamber door; each has 1.26" Ø viewing area
j. Sputtering flange allows the use of up to (3) 2" or 3" sputter sources

2. Rough Vacuum Pumping:
   a. System will be able to operate with an EDWARDS nXDS6i 3.6 cfm dry scroll roughing pump (supplied by purchaser)

3. High Vacuum Pumping:
   a. One (1) Pfeiffer HiPace 260 L/sec speed control turbo pump

4. Vacuum Gauging:
   a. Wide range vacuum gauge reads from atmosphere to 10⁻⁹ Torr
   b. All mounting and connection hardware, adapters, etc.

5. Open System Framework:
   a. Fully enclosed system base cabinet
   b. Open access to the chamber
   c. Leveling pads and caster wheels
   d. Removable enclosure panels

6. Water Distribution Manifold:
   a. Manual shut off valve at manifold
   b. NPT connections (inlet and outlet), adapters supplied when appropriate

7. Gas and Pneumatic Distribution:
   a. Inert Vent/Purge gas, compression fitting inlet
   b. Compressed air (pneumatics), compression fitting inlet
   c. Process gas, metal face seal inlet(s), adapters supplied when appropriate
8. **Power Distribution:**
   a. Single service drop, 208-240VAC, 50-60Hz, single phase, 3-wire
   b. Amperage rating based on selected components
   c. Component wiring is routed to a centralized power distribution module
   d. EMO protection
   e. Appropriate safety interlocks

9. **Control Package:**
   a. Provides for automated process control (recipe)
   b. Graphical Recipe Builder generates a recipe via mouse or touchscreen selectable user interface components
   c. Recipe Database Screen provides selection & editing of stock recipes, with copy functionality for modification of existing & saving of new recipes
   d. Programming/control via a keyboard/touch pad
   e. User Interface via .NET application run on Windows 10 PC platform
   f. Standalone Real Time Controller (RTC) executes equipment automation
   g. RTC provides uninterrupted operation, independent of the Windows Computer and User Interface status
   h. Windows 10 Laptop for User Interface
   i. Laptop facilitates monitoring and manual actuation of vacuum and deposition process components
   j. UI Navigation and Title Panel: Visual display and control of System status messages, user login/logout, operation mode, and system abort
      i. Vacuum Screen: Visual display of valve position, pump status and vacuum status
      ii. Deposition Screen: Indication of shutter position, deposition source status, source material
      iii. Gas Screen: Mass flow controller modes, gas valve status, pressure measurement and control display
      iv. Motion Screen: Display/input of position and velocity as well as control of motors
      v. Cooling Screen: Water flow switch status for all cooling channels
      vi. Heating Screen: Temperature setpoints & control parameters, PID and Auto Tuning features
   k. Standard Chart Recorder (plots up to 10 signals or “pens” simultaneously) and datalogging (.csv file)
   l. Supports multiple user accounts and password levels with custom security access for recipes and screens
m. System event log captures all user login/logout events, all recipes executed, and system status messages

10. **Magnetron Sputtering Sources:**
   a. Two (2) 3" Magnetron Sputtering Guns
      i. standard strength magnet assembly
      ii. mounted via vacuum coupling
      iii. one (1) with reverse pole magnets
   b. Capability of adding an additional 2" or 3" magnetron sputtering source mounted via vacuum coupling
   c. Typical source to substrate distance of 4"-6" (102-152mm), manually adjustable
   d. Pneumatically actuated, low profile CDS (Compact Dome Shutter) limits cross contamination between adjacent sputter sources
   e. Flex mount assembly to provide ex-situ tilt capability
   f. High Vacuum compatible
   g. Accepts up to 0.375" thick (non-magnetic) targets

11. **Magnetron Sputtering Source Power Supplies:**
   a. (1) 1500W DC power supply
   b. (1) 300W RF power supply with automatic matching network and controller

12. **Substrate Fixture and Manipulation:**
   a. Rotation and 350°C Heating
      i. Variable speed, motor driven, rotating platen (up to 20 rpm)
      ii. Accommodates multiple size substrates (up to 150mm) using multi-site fixture and substrate clips
      iii. 350°C heating
      iv. PID control of temperature
   b. Shutter
      i. Pneumatically Controlled

13. **Process Pressure Control:**
   a. Upstream Pressure Control
      i. One (1) mass flow controller (0-100 sccm), including cables
      ii. One (1) PID upstream pressure controller
      iii. One (1) Capacitance Manometer 100 mTorr (0.13 mbar) pressure transducer
      iv. Orbitally welded gas lines to provide maximum vacuum integrity
      v. Ability to adjust for correction factor in HMI
   b. Additional Process Gas Channel
      i. One (1) mass flow controller (0-100 sccm), including cables
ii. Orbitally welded gas lines to provide maximum vacuum integrity
iii. Ability to adjust for correction factor in software

14. **Film Thickness Control:**
   a. One (1) film thickness monitor
   b. One (1) single standard crystal sensor

15. **Spare Parts Package:**
   a. Includes parts generally needed for 1 year of operation including, but not limited to, the following: chamber & viewport seals, spare CF/VCR gaskets, KF/ISO centering rings, ferrules, fuses, substrate holder clips, spare heater bulbs, crystal sensor pack, mist eliminator cartridge/filter, fluid charge

C. **PERFORMANCE SPECIFICATIONS**

   **System Base Pressure:** $9 \times 10^{-7}$ Torr or less