Argonne NATIONAL LABORATORY

TECHNICAL REQUIREMENTS & SPECIFICATIONS

Automatic Thin Film Mapping Tool

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1. **General Specific Requirements**
    - Installed base:
        - Vendors shall have an installed base of at least 50 units.
        - The Vendor shall provide 3 references in the US.
        - 24hr support availability
        - US service availability: Field service engineers based in the US.
    - Power: 100-240 VAC, 50-60Hz, 1.3A
    - Spectrometer Wavelength
        - 190-1100nm
    - Light source: D2 and Halogen
    - Processor clock speed: Min 1.4GHz
    - Interface USB 2.0
    - Windows 11 compatible
    - Microscope Aperture 250µm
    - Turret: Motorized for multiple objectives (10X and 20X)
    - Autocalibration
        - The system must include an integrated automatic wavelength calibration system, without requiring user intervention, external standards, or factory recalibration
    - One set of spare lamps
    - 300nm Oxide standard
    - High Pass Filter Wheel for light sensitive materials
    - Safety: The system shall be fully enclosed with a safety door interlock that halts stage motion when the enclosure door is opened, to protect users from moving mechanical components

2. **Software**
    - Software: Must have multiple layers of user accounts. Admin/Tech/User
    - Pattern recognition capable:
        - The system shall have the option to include, fully automated pattern recognition software capable of: (a) automatic deskew correction for wafer rotation and offset; (b) center offset compensation; (c) edge

exclusion; (d) multi-site, within-die measurement capability; and (e) the ability to import external coordinate sets or configure through a guided visual setup procedure.

- Recipe creation: single and multilayer:
  - The system shall be capable of simultaneous measurement of film thicknesses for multilayer stacks of no fewer than 10 and up to 50+ individual layers using spectrum-matching algorithms
  - The software shall retain the full measurement spectrum and analysis results for at least the previous 500 measurements, allowing for re-analysis of historical data without requiring re-measurement of samples
- Full materials library; Semiconductors, dielectrics. Metals: 500+

3. **Stage: Automated**
   - Max Sample Size 200mm
   - Sample Stage : X-Y automated
   - Speed with Vacuum chuck
     - 5 points: 5s
     - 25 points: 14s
   - Navigation accuracy +/10 microns
   - Vacuum option for chuck

4. **Objectives/spot size**
   - 10x: Spot Size : 25 microns
   - 20x: Spot Size: : 13 microns

5. **Measurement Specifications**
   - 10X Objective : Thickness range 4nm-115µm
   - 20X Objective: Thickness range 4nm-85µm
   - Min Thickness to measure n and k: 50nm
   - Accuracy: 1nm or 0.2%
   - Precision: 0.02nm
   - Stability: 0.05 nm

6. **Documentation:** Vendor shall supply layout drawings, system manuals for hardware and software, user manuals for hardware and software.

7. **Deliverables:**

- Delivery location will be Argonne National Laboratory, Argonne, IL, building 440 loading dock.
- Delivery should be complete 3 months from Award
- The vendor will be responsible for all packaging, transportation and delivery to the CNM facility, Argonne National Laboratory.