

# Mississippi State University

## Notice of Proposed Sole Source Purchase

**256-031**

Mississippi State University anticipates purchasing the item(s) listed below as a sole source purchase. Anyone objecting to this purchase shall follow the procedures outlined below.

1. Commodity or commodities to be purchased (make, model, description):

Make and Model:

Thermo Fisher Scientific's Apreo ChemiSEM S Low Vac Scanning Electron Microscope(SEM) with TrueSight Energy Dispersive X-ray Spectroscopy(EDS) Detector and Truepix Electron Back Scatter Diffraction (EBSD) Camera.

Description:

The Apreo ChemiSEM S LoVac is a high-resolution Schottky field emission SEM equipped with:

- **TrueSight™ Energy Dispersive X-ray Spectroscopy (EDS) Detector- for understanding the elemental composition of a sample.**
- **TruePix™ Electron Backscatter Diffraction (EBSD) Detector- for understanding the crystallographic information (phase, crystal orientation, texture) of a sample.**

This system provides a fully integrated solution for high-resolution imaging, compositional mapping, phase identification, and crystallographic analysis.

High-performance imaging: Advanced optics with the Trinity™ Detection System (two in-lens detectors + one in-column detector) deliver high resolution and contrast across a wide range of materials, including magnetic, insulating, and beam-sensitive samples.

Live elemental mapping (EDS): ChemiSEM™ Technology enables always-on, real-time EDS quantification for faster and more reliable compositional analysis.

Crystallographic analysis (EBSD): TruePix™ EBSD Detector enables high-quality electron backscatter diffraction mapping for phase identification, grain orientation, strain analysis, and microstructural characterization.

Wide sample compatibility: Supports high- and low-vacuum operation (up to 500 Pa), allowing imaging of conductive, non-conductive, and sensitive materials without compromising quality.

Ease of use and automation: FLASH™ Technology automates alignments, SmartScan™ and Smart Frame Integration enhance imaging efficiency, and Maps™ Software automates large-area acquisitions with multi-signal integration.

Advanced analytical workflows: Avizo 2D offers powerful image processing, data analysis, and reporting tools. With the AutoScript™ 4 API, users can automate tasks using Python, track features, and integrate AI/ML workflows.

Remote access and monitoring: Secure remote access supports both live remote viewing of imaging and analysis as well as remote diagnostics and service by Thermo Fisher engineers, allowing experiments and troubleshooting without onsite presence.

User accessibility: The integrated Nav-Cam™ color navigation camera, multi-sample holder, and unified platform for SEM, EDS, and EBSD enable efficient operation for both novice and expert users.

2. Explanation of the need to be fulfilled by this item(s), how is it unique from all other options, and why it is the only one that can meet the specific needs of the department:

Need:

Our research projects need a fully integrated solution for high-resolution imaging, compositional analysis, and crystallographic characterization across a wide range of materials, including conductive, non-conductive, magnetic, and beam-sensitive samples. The system must accommodate a diverse user base—from novices to experts—as it will be housed in a core facility (I2AT) accessible to all users for a fee. Given the expected high usage and variety of applications, the system must be highly reliable, easily serviceable, and designed for minimal downtime.

Key unique capabilities include:

- **ChemiSEM™ with TrueSight EDS, and TruePix™ EBSD:** This fully integrated system provides **real-time EDS quantification, automated phase mapping, and precise crystallographic analysis**. ChemiSEM's ChemiPhase™ analysis engine uses a **big-data, statistical approach** to assign each pixel to a phase with clear probabilities, reducing user bias and increasing confidence in complex samples. By controlling SEM, EDS, and EBSD from a single software platform, ChemiSEM™ **eliminates multi-vendor inefficiencies** such as **incompatibility, miscalibration, data fragmentation and overhead**, accelerating the workflow from data acquisition to results. For MSU and its industrial partners, this system enables **faster, more comprehensive, and reliable analysis of advanced alloys, semiconductors, polymer and nanomaterials**, offering advantages over other systems. **No other manufacturer has SEM, EDS and EBSD on a single software platform for data acquisition and analysis.**

- **Serviceability and single-point accountability:** Because the SEM, EDS, and EBSD components all come from the same manufacturer, installation, maintenance, troubleshooting, and repairs can be handled by a single service provider. This eliminates conflicts between vendors, ensures faster issue resolution, and guarantees comprehensive support and system reliability over its operational lifetime. Additionally, the system supports remote diagnostics and service, allowing the manufacturer to quickly identify and resolve issues without waiting for on-site visits. This minimizes downtime and ensures the system remains operational for high-usage needs. This is also unique to this manufacturer.
- **Trinity™ Detection System:** Simultaneous acquisition from two in-lens and one in-column detector maximizes signal collection while minimizing electron beam exposure, preserving sensitive samples like polymers and semiconducting nanomaterials that are highly susceptible to e-beam damage. This combination of detectors is exclusive to this instrument. For MSU researchers working on advanced materials, energy storage, and semiconducting nanomaterials, this capability ensures high-quality imaging while protecting valuable and often limited samples. This combination of detectors is exclusive to this instrument.
- **Automation and user accessibility:** Proprietary software including FLASH™, SmartScan™, Smart Frame Integration (SFI), Maps™ Software, Avizo 2D and AutoScript™ ensures reproducible, high-quality imaging and analytical workflows. These features support novice users while enabling advanced automation, AI/ML-based analysis, and high-throughput research. This is also very suitable for MSU, as the new graduate/undergraduate students will be trained on this instrument.

3. Name of company/individual selling the item and why that source is the only possible source that can provide the required item(s):

Thermo Fisher is the only provider able to supply an integrated SEM, EDS, and EBSD system with the proprietary combination of hardware and software required. It is also the only manufacturer with Trinity detector (2 in-column + 1 in-lens detector). Features—including Trinity™ Detectors, ChemiSEM™, PivotBeam™, TruePix™, FLASH™, SmartScan™, Maps™, and AutoScript™—are exclusive to Thermo Fisher. Only Thermo Fisher can provide single-point service, rapid remote diagnostics, and comprehensive maintenance, ensuring minimal downtime and reliable operation in a high-usage core facility.

4. Estimated cost of item(s) and an explanation why the amount to be expended is considered reasonable:

Cost: \$665,917

The above cost considered reasonable given the system's unique capabilities and fully integrated functionality. Additionally, its price includes academic discount, shipping w/ insurance cost, 2 additional years of service contract (in addition to default 1 year warranty) and 4-day onsite training. A research award from NSF will support the purchase of this instrument **(NSF Award #2510038)**.

5. Explanation of the efforts taken by the department to determine this is the only source and the efforts used to obtain the best possible price:

A team of researchers successfully secured NSF funding to acquire this SEM, addressing the critical research need at MSU. Prior to submission, the team and I2AT conducted a comprehensive review of potential vendors, including obtaining multiple competitive quotes and submitting samples for evaluation. Through this process, it was determined that only Thermo Fisher's fully integrated system could meet all the required technical and operational specifications. No alternative vendor could provide the same combination of SEM, EDS, and EBSD technologies on a single platform with the required reliability, serviceability, and performance.

To ensure the best possible pricing, the department successfully negotiated the inclusion of two critical software packages—Avizo 2D and AutoScript™, thereby enhancing system capabilities without additional cost. These efforts demonstrate both due diligence in vendor evaluation and success in achieving the most cost-effective procurement.

Any person or entity that objects and proposes that the commodity listed is not sole source and can be provided by another person or entity shall submit a written notice to:

Jennifer Mayfield, CPPO

Director of Procurement Services, Chief Procurement Officer

[jmayfield@procurement.msstate.edu](mailto:jmayfield@procurement.msstate.edu)

Subject Line must read "Sole Source Objection"

The notice shall contain a detailed explanation of why the commodity is not a sole source procurement. Appropriate documentation shall also be submitted if applicable.

If after a review of the submitted notice and documents, MSU determines that the commodity in the proposed sole source request can be provided by another person or entity, then MSU will withdraw the sole source request publication from the procurement portal website and submit the procurement of the commodity to an advertised competitive bid or selection process.

If MSU determines after review that there is only one (1) source for the required commodity, then MSU will appeal to the Public Procurement Review Board. MSU will have the burden of proving that the commodity is only provided by one (1) source.