MEP National Network™

COMPLETE THIS FORM TO INITIATE SUPPLIER SCOUTING

MEPNN Supplier Scouting Opportunity Synopsis

☑ *The submitting organization (ex. MEP Center, requesting company, federal/state agency) agrees to notify NIST MEP of the status of actions taken as a result of this scouting instance within 30 days after receiving a results report. Notification should be via email to scouting@nist.gov, indicating the following:

- Contact with matches identified in report complete and supply contract awarded, process complete
- Contact with matches identified in report complete and no supply contract awarded, process complete
- Contact with matches identified in report complete and supply negotiations underway, process in progress
- Contact with matches identified in report underway; supply negotiations not yet begun; process in progress
- Contact with matches identified in report not yet begun, process in progress
- Contact with matches identified in report will not occur within the next 6-months, process complete

Analytical Transmission Electron Microscopes

Item to be Scouted

30 **days**

Opportunities will be posted for 30 days unless specified

Please describe the item application/ the end use of item.* Provide the item number if applicable: (N95 Mask vs Protective Mask).

The analytical transmission electron microscope systems will be used in support of the CHIPS and Science act to inspect semiconductor devices and materials at the atomic scale.

2022-121

Supplier Scouting Number (NIST MEP use)

334516

Scouting customer/product NAICS Code, if known

TECHNICAL INFORMATION:

1. Supplier Information

a. Type of supplier being sought*

☑ **Manufacturer** ☐ **Contract Manufacturer** ☑ **Distributor**

☐ **Other** _____

b. Reason for scouting submission*

☐ **2nd Supplier** ☑ **Price** ☑ **Re-shore** ☐ **Past supplier no longer available**

☐ **New Product Startup**

☐ **Other** _____

2. Summary of Technical Specifications and Performance Requirements:

a. Describe the manufacturing processes (elaborate to provide as much detail as possible).*

High-precision manufacturing of electromagnetic lenses, specimen stages, and vacuum systems.

b. Provide dimensions / size / tolerances / performance specifications for the item.*

Please see attached specification document.

c. List required materials needed to make the product, including materials of product components.*

The microscopes are usually constructed mostly of stainless steel, aluminum, and copper. A system usually consists of an electron source, a series of lenses to focus and scan the electron beam, and a high-precision stage to move the specimen around. The vacuum system will include roughing, turbo-molecular, and ion pumps.

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BUSINESS INFORMATION:	2. Summary of Technical Specifications and Performance Requirements cont:	**d. Are there applicable certification requirements?*** ☐ Yes ■ No **Please explain**
		e. Are there applicable regulations?* ☐ Yes ■ No **Please explain**
		f. Are there any other standards, requirements, etc.?* ☐ Yes ■ No **Please explain**
		g. Additional Comments: Is there other information that would impact the item's performance or usefulness? Please explain.
		The item must meet the minimum specifications listed in the attached document.
	3. Volume and Pricing	**3a. Estimated potential business volume (i.e., # Units Per Day, Month, Year) *:**
		One unit per month, though at this time NIST in Boulder, CO is seeking two analytical transmission electron microscopes at this time.
		b. Estimated target price / unit cost information (if unavailable explain) ***:**
		Estimated pricing is unavailable to protect the integrity of the procurement process.
	4. Delivery Requirements:	**a. When is it needed by? (Immediate, 30 Days, 6 months, etc.)***
		ASAP
		b. Describe packaging requirements (i.e., individually/group packaging)*
		Instrument systems should be packaged and delivered individually.
		c. Where will this item be shipped? *
		NIST, 325 Broadway, Boulder, CO 80305
	5. Additional Comments:	**Is there other information you would like to include?**
		Please see the attached document describing instrument specifications.

Photos or diagrams of the item (helpful but not required).

SUPPLIER SCOUTING ATTACHMENT

Requirement:

NIST is seeking information from vendors capable of providing a suite of two analytical transmission electron microscopes (TEMs). The TEM systems will be installed and operated in a multi-user precision imaging facility. The imaging facility supports multiple internal users by providing microscopy and microanalysis capabilities. Samples of interest include (but are not limited to) microfabricated, on-wafer devices and other solid-state electronics systems, as well as metal alloys.

The TEM systems will be **installed on the Boulder, CO campus**. The contractor shall furnish the necessary personnel, material, equipment, and services to fabricate, install, and test two complete transmission electron microscope systems. The contractor shall provide training at the time of installation and the complete system must be fully integrated, serviced, and warrantied by the single offeror.

NIST is specifically seeking to buy two TEM systems from the same vendor specifically to simplify instrument management, instrument service, and user training. NIST also seeks to share accessories (e.g. standard and/or specialized sample holders) between the two instruments, such that the sample stages and/or goniometers on the two systems should accept identical sample holders. Additionally, NIST seeks two systems with identical (or significantly similar) software user interfaces to minimize the time required to train users between the two microscopes.

Provide information regarding the following specifications:

Common Requirements Between Systems:

1) The systems below should all have identical sample stage and/or goniometer geometry to allow for the transfer of sample holders and accessories between systems
2) The systems listed below should have identical (or extremely similar) computer software/user interfaces
3) The systems below should share a common scripting language (preferably Python based) such that scripted routines or automations can be used on either of the instruments

System 1 – Analytical S/TEM:

An analytical microscope for ultra-high-resolution imaging, as well as high-speed chemical imaging of materials.

Specific model information (in alphabetical order): Hitachi HF5000, JEOL Grand ARM300F2, Thermo Fisher Spectra 300, Thermo Fisher Spectra Ultra, or similar.

Specifications:

1) Vacuum system capable of maintaining high vacuum ($<1\times10^{-5}$ Torr) in the sample chamber
2) An electron imaging system that includes:

a. The ability to produce an electron beam at accelerating voltages between 40 kV and 300 kV
    i. *Please provide information on your ability to produce an electron beam with an accelerating voltage lower than 40 kV*
b. An electron energy spread of 0.4 eV or better
    i. *Please comment on your ability to provide an electron energy spread better than 0.4 eV. This improved specification may be achieved via electron gun design or a separate monochromator system.*
c. The ability to operate in transmission electron microscopy (TEM) and scanning transmission electron microscopy (STEM) modes.
d. An aberration corrector enabling spatial resolution of better than 0.080 nm or better in STEM mode
    i. *Please comment on the resolution of your instrument if it is better than 0.080 nm in STEM mode via aberration correction*
e. A point-to-point resolution of 0.17 nm or better in TEM mode without an aberration corrector
    i. *Please comment on the resolution of your instrument in TEM mode if it is better than 0.17 nm without TEM aberration correction.*

3) A camera enabling imaging in TEM mode at a rate of >20 frames per second
    a. *Please provide information about your available TEM cameras and their specifications*
    b. *Please comment whether these TEM cameras are capable of performing the technique known as 4D STEM when imaging in STEM mode*
4) A segmented annular dark field STEM detector and bright field STEM detector
    a. *Please comment on the sensitivity of your annular dark field and bright field STEM detectors.*
5) The ability to be fitted with a direct electron detector suitable for four-dimensional imaging in STEM mode (4D STEM).
    a. *Please comment on the capabilities of your specific 4D STEM detector options*
6) The ability to be fitted with a biprism for holographic electron imaging
7) The ability to be fitted with a large-area X-ray detector to allow for chemical imaging
    a. *Please comment on the size (in solid angle/steradians) of your detector options and any restrictions these detectors may place on standard microscope operation (e.g. imaging resolution, maximum tilt angles, etc.)*
8) The ability to be fitted with a spectrometer (Gatan Continuum or similar) or imaging filter (Gatan Continuum or similar) to allow for the collection of electron energy loss spectra and images.
9) The ability to accept numerous multi-functional specimen holders, including single-tilt, double-tilt, heating, cooling, and electrical biasing, among others.

System 2 – High Throughput TEM:

An analytical microscope for high-throughput imaging of materials specimens, as well as high-speed chemical imaging.

Specific model information (in alphabetical order): JEOL ACE200F, JEOL F200, Thermo Fisher Talos F200X, or similar

Specifications:

1) Vacuum system capable of maintaining high vacuum ($<1\times10^{-5}$ Torr) in the sample chamber
2) An electron imaging system that includes:
    a. The ability to produce an electron beam at accelerating voltages between 60 kV and 200 kV
        i. Please provide information on your ability to produce an electron beam with accelerating voltage lower than 60 kV
    b. An electron energy spread of 1.0 eV or better
        i. *Please comment on your ability to provide an electron energy spread better than 1.0 eV*
    c. The ability to operate in transmission electron microscopy (TEM) and scanning transmission electron microscopy (STEM) modes.
    d. A spatial resolution of 0.16 nm or better in STEM mode
    e. A point-to-point resolution of 0.19 nm or better in TEM mode
3) A camera enabling imaging in TEM mode at a rate of >20 frames per second
    a. Please provide information about your available TEM cameras and their specifications
    b. Please comment whether these TEM cameras are capable of performing the technique known as 4D STEM when imaging in STEM mode
4) A segmented annular dark field STEM detector and bright field STEM detector
    a. *Please comment on the sensitivity of your annular dark field and bright field STEM detectors.*
5) The ability to be fitted with a direct electron detector suitable for four-dimensional imaging in STEM mode (4D STEM).
    a. Please comment on the capabilities of your specific 4D STEM detector options
6) The ability to perform Lorentz imaging of magnetic materials
7) The ability to be fitted with a large-area X-ray detector to allow for chemical imaging
    a. *Please comment on the size (in solid angle/steradians) of your detector options and any restrictions these detectors may place on standard microscope operation (e.g. imaging resolution, maximum tilt angles, etc.)*
8) The ability to be fitted with a spectrometer (Gatan Continuum or similar) or imaging filter (Gatan Continuum or similar) to allow for the collection of electron energy loss spectra and images.
9) The ability to accept numerous multi-functional specimen holders, including single-tilt, double-tilt, heating, cooling, and electrical biasing, among others