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

Focused Ion Beam and Scanning 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 focused ion beam and scanning electron microscope systems will be used in support of the CHIPS and Science act to inspect and modify semiconductor devices and materials.

2022-122

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 and/or ion source, a series of lenses to focus and scan the electron/ion beam, and high-precision 5-axis stage to move the specimen around. The vacuum system will include roughing and turbo-molecular 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 focused ion beam instruments and one scanning electron microscope instrument.
		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 focused ion beam/scanning electron microscope (FIB-SEM) systems and one scanning electron microscope (SEM) system. The FIB-SEM systems and SEM system 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 FIB-SEM systems and SEM system 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 focused ion beam/scanning electron microscope systems and one complete scanning electron microscope system. The contractor shall provide training at the time of installation and the complete systems must be fully integrated, serviced, and warrantied by the single offeror.

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

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

Focused Ion Beam System 1:

A focused ion beam/scanning electron microscope (FIB/SEM) system to specialize in the production of samples for transmission electron microscopy and atom probe tomography.

Specific model information (in alphabetical order): Hitachi NX5000, JEOL JIB-4700F, Tescan AMBER, Thermo Fisher Helios 5, Zeiss Crossbeam 550, or similar

Specifications:

1) Vacuum system capable of maintaining high vacuum ($<1\times10^{-5}$ Torr) in the sample chamber
2) A scanning electron imaging system that includes:
    a. The ability to produce an electron beam at accelerating voltages between 0.5 kV and 30 kV
        i. Please comment on the ability to produce electron beam landing energies less than 0.5 keV
    b. An imaging resolution of 0.8 nm or better
        i. Please comment on the ability to provide an electron beam energy better than 0.8 nm
3) A scanning Ga+ ion beam system that includes:
    a. The ability to produce an ion beam at accelerating voltages between 0.5 kV and 30 kV
    b. The ion beam should be optimized for low acceleration voltages to minimize Ga+ ion implementation on the sample surface
        i. Please comment on the low accelerating voltage of your ion beam system
    c. A maximum ion beam current of at least 65 nA
        i. Please comment on the abilities of your ion system to exceed beam currents of 65 nA
    d. A resolution of 3.0 nm or better
4) A suite of electron and/or ion detectors to include:
    a. A secondary electron detector
    b. An in-lens secondary electron and backscatter detector
    c. A retractable segmented backscatter electron detector
        i. Please comment on the segment geometry of the detector
    d. A detector for imaging with transmitted electrons (STEM)
    e. Additional electron/ion detectors
        i. Please comment on additional detectors not listed above
5) A camera to allow viewing inside the chamber
    a. *Please comment on your ability to provide more than one camera to view inside of the chamber*
6) Gas injection system to allow for the electron- or ion-beam deposition of platinum, carbon, tungsten, and an insulating material, among other chemistries
    a. Please comment on the geometry of your gas injection system(s)
7) A software-integrated micromanipulator
    a. Please provide information about the software integration of your micromanipulator
8) A Python-based scripting interface to allow for automated operation of the system
    a. Please provide information about the instrument scripting interface if it is not Python-based.
9) The ability to be fitted with X-ray and diffraction detectors from other vendors including (in alphabetical order): Bruker Quantax, EDAX Velocity, EDAX Octane, Oxford Ultim Max, Oxford Symmetry S3, or similar
    a. Please comment whether your system and/or software integration excludes any major analytical detector vendor

10) A five-axis stage with X/Y travel of 150 mm or greater
    a. *Please comment on the stage mobility (including X/Y motion and tilt) when a six inch (152.4 mm) silicon wafer is loaded into the system*

Focused Ion Beam System 2:

A focused ion beam/scanning electron microscope (FIB/SEM) system to specialize in the chemical and structural analysis of materials. This system will also serve as a secondary sample preparation system for transmission electron microscopy and atom probe tomography.

Specific model information (in alphabetical order): Hitachi NX5000, JEOL JIB-4700F, Tescan AMBER, Thermo Fisher Scios 2, Zeiss Crossbeam 350, or similar

Specifications:

1) Vacuum system capable of maintaining high vacuum ($<1\times10^{-5}$ Torr) in the sample chamber
2) A scanning electron imaging system that includes:
    a. The ability to produce a electron beam at accelerating voltages between 1 kV and 30 kV
    b. An imaging resolution of 1.0 nm or better
3) A scanning Ga+ ion beam system that includes:
    a. The ability to produce an ion beam at accelerating voltages between 0.5 kV and 30 kV
    b. A maximum ion beam current of at least 65 nA
    c. A resolution of 4.0 nm or better
4) A suite of electron and/or ion detectors to include:
    a. A secondary electron detector
    b. An in-lens secondary electron and backscatter detector
        i. *Please provide information about additionally available detectors (in-column or otherwise)*
    c. A retractable segmented backscatter electron detector
    d. A detector for imaging with transmitted electrons (STEM)
5) A camera to allow viewing inside the chamber
    a. *Please comment on your ability to provide more than one camera to view inside of the chamber*
6) Gas injection system to allow for the electron- or ion-beam deposition of platinum and carbon
7) A software-integrated micromanipulator
    a. *Please provide information about the software integration of your micromanipulator*
8) A Python-based scripting interface to allow for automated operation of the system
    a. *Please provide information about the instrument scripting interface if it is not Python-based*

9) The ability to be fitted with X-ray and diffraction detectors from other vendors (Bruker Quantax, EDAX Velocity, EDAX Octane, Oxford Ultim Max, Oxford Symmetry S3, or similar)
10) The ability to be fitted with a software-integrated secondary ion mass spectrometer (SIMS) system for the chemical analysis of secondary ions
    a. *Please provide information about your common SIMS detector options*
    b. *Please provide information about whether you provide any SIMS detector options which are integrated into your main user interface*
11) A five-axis stage with X/Y travel of 100 mm or greater
    a. *Please provide information about stage motion greater than 100 mm*

Scanning Electron Microscope System:

A scanning electron microscope (SEM) system to specialize in the structural and chemical analysis of materials.

Specific model information (in alphabetical order): Hitachi SU7000, JEOL JSM-IT800HL, Tescan Clara, Thermo Fisher Apreo 2S, Zeiss Sigma 300, or similar

Specifications:

1) Vacuum system capable of maintaining high vacuum ($<1\times10^{-5}$ Torr) in the sample chamber
2) A scanning electron imaging system that includes:
    a. The ability to produce an electron beam at accelerating voltages between 1 kV and 30 kV
        i. *Please comment on your ability to provide beam voltages less than 1 kV*
    b. An imaging resolution of 1.0 nm or better
        i. *Please comment on your ability to provide electron imaging resolutions better than 1.0 nm*
3) A suite of electron detectors to include:
    a. A secondary electron detector
    b. An in-lens secondary electron and backscatter detector
        i. *Please provide information about additionally available detectors (in-column or otherwise)*
    c. A retractable segmented backscatter electron detector
    d. A detector for imaging with transmitted electrons (STEM)
4) A camera to allow viewing inside the chamber
    a. *Please comment on your ability to provide more than one camera to view inside of the chamber*
5) A Python-based scripting interface to allow for automated operation of the system
    a. *Please provide information about the instrument scripting interface if it is not Python-based*
6) The ability to be fitted with X-ray and diffraction detectors from other vendors, including (in alphabetical order): Bruker Quantax, EDAX Velocity, EDAX Octane, Oxford Ultim Max, Oxford Symmetry S3, or similar

7) The ability to be fitted with a cathodoluminescence spectrometer from other vendors, including (in alphabetical order): Gatan Monarc, Horiba CLUE, or similar
8) A five-axis stage with X/Y travel of 100 mm or greater
    a. *Please provide information about stage motion greater than 100 mm*