This is a SOURCES SOUGHT NOTICE for market research purposes.

THIS IS NOT A REQUEST FOR QUOTATIONS OR A REQUEST FOR PROPOSALS.

To fulfill the mission of the National Institute of Standards and Technology, Material Measurement Laboratory (MML), Materials Science and Engineering Division (MSED), measurement capability for ultrafast materials science is being developed. MSED has a need for the development of an alpha prototype laser-free, stroboscopic transmission electron microscope. This need came about because, at present, there is no easy way to measure high-repetition-rate, ultrafast phenomena (> GHz) at atomic length scales.

Once NIST has this new capability, it will be one of the first institutions in the world to gain simultaneous access to phenomena that happens at the ultra-fast and ultra-small extreme. Areas that will benefit from this new measurement innovation include the semiconductor industry, telecommunications, photonics, and MEMS.

It is intended that the prototype be constructed by modifying an existing JEOL JEM-3010 TEM and timed electron pulses shall be delivered without the use of a laser.

The following are the specifications considering the performance specifications of the existing TEM and the intended modifications. The following specifications are provided for market research purposes only. Final specifications shall be determined based on information received, NIST's minimum requirements, and analyses performed by NIST. NIST anticipates the need to acquire one prototype.

The Prototype

1. Must not require a laser to operate.
2. Must chop the beam before the microscope's condenser lens system.
3. Must chop (strobe) the electron beam at a continuously variable rate between 2 and 20 GHz.
4. Relative to the unmodified instrument, beam duty cycle must be at least $1x10^{-3}$.
5. Must be able to demonstrate a temporal resolution of 1 ps or faster, sub 500 fs resolution is preferred.
6. At any given strobe rate, the temporal resolution must be tunable.
7. While operating in the stroboscopic mode, spatial, temporal, and beam energy must remain stable for 12 hours of continuous operation, and these attributes must not differ significantly from the performance of the unmodified microscope.
    - 7.1. The Prototype must not exceed a maximum rms *additional* energy spread of 0.81 eV (relative to the instrument's native spread of 1 eV at 300 keV). Solution demonstrating the most aggressive reduction in this additional energy spread is preferred.
    - 7.2. The Prototype must not exceed a maximum rms emittance of 0.4 nm x rad. Solution demonstrating the most aggressive reduction in emittance is preferred.
    - 7.3. Column heating, temperature fluctuations, and vibrations produce problems for imaging and data acquisition in the form of specimen drift and peripheral equipment (e.g., EDX detectors, apertures) instabilities. Therefore, the operation temperature of the Prototype must not increase by more than 10 °C. The total specimen drift at the specimen level for the Prototype (including mechanism for Module cooling, if needed) shall not be significantly different from the unmodified instrument.
    - 7.4. Column vacuum must remain below $2.5x10^{-5}$ Pa.
8. When not operating in the stroboscopic mode, the Prototype must preserve (or surpass) all states, performance, function, and capabilities of the unmodified microscope.

TEM Column modification and integration

1. Beam coupling and collimation must be maintained for all strobe frequencies as the unmodified instrument would normally couple into its first condenser lens, for any given extractor setting of the unmodified instrument.

2. The finished height of the Prototype shall be no taller than the room clearance, which is 3.0 meters (under support beam) and 3.2 m (in between support beams).

NIST is seeking responses from all responsible sources, including large, foreign, and small businesses. Small businesses are defined under the associated NAICS code for this effort, 334516, as those domestic sources having 500 employees or less. Please include your company's size classification in any response to this notice.

It is highly anticipated that an established business relationship with the company JEOL is required to build the prototype. NIST has an existing JEOL microscope available for modification. Any modification to the microscope column will require engineering diagrams from JEOL.

Companies with the capabilities to develop and deliver the intended stroboscopic microscope are requested to email a detailed response describing their abilities to carol.wood@nist.gov no later than the response date for this sources sought notice. The response shall include, at a minimum:

-Achievable specifications and documentation of equipment produced that meets the achievable specifications;

-Demonstrated expertise in electron beam chopping at energies between 100 and 300 keV;

-Evidence of an established relationship with JEOL;

-Prior experience modifying JEOL microscopes;

-Name and business size of the company that will perform the intended work;

-If a commercial item is being described, the name of the manufacturer and the name of company(ies) that are authorized to sell the systems, their addresses, and a point of contact for the company (name, phone number, fax number and email address);

-Indication of number of days, after receipt of order that is typical for delivery of the intended equipment;

-Any other relevant information that is not listed above which the Government should consider in finalizing its market research.

All documentation must be sent to Carol A. Wood, Contract Specialist, at the National Institute of Standards and Technology, Acquisition Management Division, 100 Bureau Drive, Mail Stop 1640, Gaithersburg, MD 20899-1640. E-mail address: CAROL.WOOD@NIST.GOV.

Submission must be received not later than 3:30 PM local time on March 18, 2016.