



DEPARTMENT OF THE NAVY
NAVSUP FLEET LOGISTICS CENTER NORFOLK
1968 GILBERT STREET SUITE 600
NORFOLK VA 23511-3392

IN REPLY REFER TO
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JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION

1. Identification of Agency and Contracting Activity.

The requiring activity is the United States Naval Academy (USNA), and the contracting activity is the U.S. Navy Naval Supply Systems Command (NAVSUP) Fleet Logistics Center, Norfolk, VA (NAVSUP FLC Norfolk).

2. Description of the Action Being Approved.

Award of a contract on a sole source basis is for a MultiMode 8 Package System (Multimode 8) by Bruker Nano Inc. (Bruker), which is an industrial standard atomic force microscope capable of multiple imaging modes in both air and fluid. The instrument must include the following standard atomic force microscopy techniques: contact and non-contact atomic force, lateral force, and TappingMode (air and fluid). The instrument selected is a state-of-the-art commercially available system that is capable of the required and additional imaging techniques, as well as future modifications and enhancements (in hardware and software). The MultiMode 8 is specifically designed and configured for performing all major scanning probe microscopy imaging techniques without needing to be in a closed hood enclosure. These techniques include the following: contact and non-contact atomic force, lateral force, TappingMode (air), magnetic force, electric force microscopy, ScanAsyst mode (continuously adjusts scan rate, set point, etc. for the best quality image), force modulation (air and fluid), TappingMode (fluid), scanning tunneling, electrochemical AFM and STM, Nanoidenting, and Bruker's "peak force tapping" PeakForce QNM and PeakForce KPFM. The MultiMode 8 by Bruker also includes the NanoScope V controller and updated image analysis software (NanoScope Analysis Software).

3. Description of Supplies/Services.

Only this sole source, Bruker, can furnish the requirements of the MultiMode 8 needed for research and development. The following are specific characteristics to the MultiMode 8: Only system to provide unique modes for measurement and analysis of sample surfaces. These modes include PeakForce Kelvin Probe Force Microscopy (PeakForce KPFM), PeakForce Quantitative Nanoscale Mechanical Characterization (PeakForce QNM) and TappingMode (intermittent contact of the cantilever probe tip with the sample surface, less destructive to sample and tip). PeakForce KPFM included in the system will enable quantitative work function mapping at top spatial resolution with higher sensitivity and immunity to artifacts from mechanical crosstalk. PeakForce KPFM can also resolve and quantify nanoscale work function variations that are challenging in basic TappingMode. PeakForce QNM utilizes PeakForce Tapping technology which maps and distinguishes nanomechanical properties while imaging topography at an atomic scale resolution. PeakForce QNM is the only available imaging mode that will provide quantitative nanomechanical properties (modulus, adhesion, dissipation, and deformation) while imaging. This mode also enables the researcher to precisely control probe-to-sample interaction, providing the lowest available imaging forces, while simultaneously property mapping the surface. The force control allows for consistent, highest resolution Multimode 8 imaging for the widest range of samples (softest biological samples to very hard samples). The MultiMode 8 is equipped with Bruker's proprietary ScanAsyst atomic force microscopy scan technology. This mode offers automatic optimization of an image, while continuously adjusting the scan rate, setpoint and gains to obtain the highest quality image in the fastest amount of time. The MultiMode 8 also enables imaging in fluid with no need for tuning of the cantilever and with the ScanAsyst atomic force microscopy scan technology to continuously monitor

the tip-sample interaction force, thereby eliminating setpoint drift. The MultiMode 8 is the only system that has the ability to be upgradeable with many additional options and application modules to perform advanced characterization. All upgrades are "plug and play" in the field upgrades to be added. Only this system includes two independent scanners (a 125 μm x 125 μm scanner commonly for general purpose and a 10 μm x 10 μm scanner for molecular resolution), which can both support ALL operating modes without exception and have a piezo tube design. A piezo tube design is necessary for atomic force microscopy, because it facilitates tiny, accurate, and precise movements on electrical command, to enable very precise scanning. In a piezo tube, when a voltage is applied to piezoelectric elements, the tube scanner can move the sample in x, y, and z directions. Having a piezo tube design is advantageous to provide better vibration isolation for atomic force microscopy. Both the 125 μm x 125 μm and 10 μm x 10 μm scanners can support atomic resolution. The MultiMode 8 has the ability to apply the PeakForce imaging mode in fluid to electrochemistry. This ability is only available with a MultiMode 8 from Bruker. By imaging in fluid with electrochemical experiments, this opens a vast, new area of research in electrochemistry and provides new applications of MultiMode 8 to electrochemical experiments. Only this system, MultiMode 8, provides a unique design in which it does not need to be in a closed hood enclosure. This makes it advantageous for experimental research and design. In the unique design, the MultiMode 8 also consists of open loop scanners with non-linearization technology, which utilizes the lowest noise floor possible. The patented scan correction for an open loop scanner provides exclusive technology to linearize the scanner without a closed loop feedback.

The USNA has requested the procurement of the following MultiMode 8 parts:

Part Number	Item Description	Quantity	Unit Price	Total
Multimode2-Sys	Multimode SPM System *	1		
AS-12VLR-2	Liquid Resist MM Scan 10x10 μm	1		
AS-130VLR-2	Liquid Resist MM Scan 125x125 μm	1		
UNIVECPOT	Universal Bipotentiostat for E	1		
MMTMEC	Electrochemistry Tapping Mode	1		
MMSTMEC	Electrochemistry STM Converter	1		
MMHC-A60	60-Degree Air/Fluid Heater PAC	1		
MMHFC	Heater/Cooler Fluid Cell Kit	1		
MTFML-V2	Tapping Mode Fluid Cell V2	1		
MMNISO	NanoIndenting/Scratching OPT	1		
MM8-PFKPFM	MM8 PFKPFM Accessory	1		
MTFML-V2	Cantilever Holder for Scanning in Fluid	1		
VT-102-2	Vibration Isolation Table	1		
ITCS3	Three Days Installation & Training for New System	1		
ITCS	Two-Day Installation & Training for New Systems	1		
Total				

4. Statutory Authority Permitting Other than Full and Open Competition.

The statutory authority permitting other than full and open competition is 41 U.S.C. 1901 – a sole source acquisition under the authority of the test program for certain commercial items, as implemented by FAR 13.501(a).

5. Rationale Justifying Use of Cited Statutory Authority.

The MultiMode 8 is equipped with two atomic force microscopy imaging techniques that are exclusive and proprietary to Bruker: ScanAsyst and PeakForce Tapping. Bruker holds patents for the following:

- Method and apparatus of using PeakForce Tapping Mode to measure physical properties of a sample (ScanAsyst) – (Patent U.S. Provisional 61/417,837)
- Method and apparatus of operating a scanning probe microscope (PeakForce Tapping) – (Patents 20100122385, 20110167524)
- Method and apparatus for obtaining quantitative measurements using a probe based instrument (PeakForce Tapping) – (International patent EP2040265A3)
- Method and apparatus of high speed property mapping – (International patent EP1938040A2)

The MultiMode 8 is also unique in design consisting of a patented scan correction for open loop scanners to provide exclusive technology to linearize the scanner without a closed loop feedback non-linearization technology which utilizes the lowest noise floor possible.

Only Bruker can provide these two imaging modes which are fundamental to the research and analysis to be conducted in my research lab. With these two proprietary and patented imaging modes, only this system can provide the additional imaging modes of PeakForce KPFM, PeakForce QNM PeakForce TappingMode, and ScanAsyst. PeakForce KPFM, which is included in the system, will enable quantitative work function mapping at top spatial resolution, with higher sensitivity and immunity to artifacts from mechanical crosstalk. PeakForce QNM utilizes PeakForce Tapping technology, which maps and distinguishes nanomechanical properties, while imaging topography at an atomic scale resolution. PeakForce QNM is the only available imaging mode that will provide quantitative nanomechanical properties while imaging. PeakForce QNM maps and differentiates between nanomechanical properties (modulus, adhesion, deformation, etc.), while simultaneously imaging sample topography. Only this sole source, Bruker, can furnish the requirements of the atomic force microscope needed for research and development.

If a MicroMode 8 was purchased without these imaging modes (PeakForce QNM and PeakForce KPFM), research, analysis, and laboratory development would be greatly affected. I would be unable to ascertain nanomechanical properties of protein-surface interactions, as well as correlate such properties with neurodegenerative protein aggregation, which is a key aspect of my research. PeakForce QNM is the only imaging mode which can enable correlation of an atomic force microscopy image with quantitative mapping of mechanical, chemical, and biochemical interactions. PeakForce QNM is a non-destructive imaging mode, which means it will not affect the sample and surface by utilizing it, which is necessary for obtaining nanomechanical properties (modulus, adhesion, etc.) and viscoelastic properties of fragile protein aggregates and delicate lipid membranes. PeakForce KPFM is a nanoelectrical characterization mode that measures surface potential. Without this imaging mode, this surface property will be unable to be measured accurately, which will impact my research and others within the department. PeakForce QNM and PeakForce KPFM are necessary imaging modes for the continuation of current research projects, which will utilize atomic force microscopy.

6. Description of Efforts Made to Solicit Offers from as Many Offerors as Practicable.

The synopsis required by FAR 5.201 will be published on the Government-wide point of entry specifying the Government's intent to procure these items on a sole source basis from Bruker Nano Inc.

7. Determination of Fair and Reasonable Cost. The contracting officer will determine the anticipated price to the Government for the services to be fair and reasonable in accordance with FAR 13.106-3.

8. Market Research

Market research was conducted to ascertain if the requirement meets the Federal Acquisition Regulation (FAR) definition of a commercial item. In accordance with FAR Part 10, a determination has been made that the required supplies are of a type offered and sold competitively in the commercial marketplace based on established catalog or market prices for specific supplies under standard commercial terms and conditions. Market research established that the Government's need can be met by a type of item that is customarily available in the commercial marketplace and meets the definition of a commercial item, FAR 2.1. Market research was conducted by reviewing the Federal Business Opportunities (FEDBIZOPPS), the GSA Federal Supply Schedule website, and internet search engines. Nothing was found through these searches that met the requirements of the USNA.

The Contract Specialist contacted the customer regarding the sole source request for this requirement with Bruker. The GLS Lease vs Purchase Form showed two (2) sources that could provide the require items, Bruker and Keysight Technologies, Inc. (Keysight). The customer stated that the Keysight product met some of their requirements, but does not have the advanced electrochemistry and nanoindenting required capabilities that are present in the patented Bruker product. There are no resellers for the Bruker product.

Based on the market research, it is reasonable to expect that only one source; Bruker, is capable and will respond to the solicitation. Determination was made by the Contract Officer to pursue a contract via a Sole Source Solicitation posted on Navy Electronic Commerce On-Line (NECO).

9. Actions to Remove Barriers to Future Competition.

For the reasons set forth in Paragraph 5, NAVSUP FLC Norfolk has no plans at this time to compete future contracts for the types of supplies covered by this document. If another potential source emerges, NAVSUP FLC Norfolk will assess whether competition of future requirements is feasible.

10. Contracting Point of Contact

The point of contact at NAVSUP FLC Norfolk is Mr. William S. Powell, who can be reached at (757) 443-1448, or by email at william.s.powell@navy.mil.