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## OFFICE OF SCIENCE AND TECHNOLOGY POLICY

### NATIONAL NANOTECHNOLOGY COORDINATION OFFICE

Request for Information: NNI Nanotechnology for Sensors and Sensors for Nanotechnology Signature Initiative

**ACTION:** Notice of request for information

**SUMMARY:** The purpose of this Request for Information (RFI) is to enhance the value of the National Nanotechnology Initiative (NNI) and of the Nanotechnology Signature Initiative (NSI) entitled Nanotechnology for Sensors and Sensors for Nanotechnology in particular, by reaching out to the nanotechnology stakeholder community for input regarding specific needs for the accelerated development and commercialization of nanosensors. This RFI is intended to inform planning for a public workshop organized under the auspices of the sensors NSI.

**DATES:** Responses to this RFI will be accepted through 11:59 p.m. Eastern Time on November 15, 2013.

**ADDRESSES:** Responses to this RFI may be submitted electronically in the body of or as an attachment to an e-mail sent to [NNISensorsRFI@nnco.nano.gov](mailto:NNISensorsRFI@nnco.nano.gov). Questions and responses may also be sent by mail (please allow additional time for processing) to the address: National Nanotechnology Coordination Office, ATTN: NNI Sensors RFI, 4201 Wilson Blvd, Stafford II, Suite 405, Arlington, VA 22230.

**FOR FURTHER INFORMATION CONTACT:** Any questions about the content of this RFI should be sent to [NNISensorsRFI@nnco.nano.gov](mailto:NNISensorsRFI@nnco.nano.gov). Additional information regarding this RFI can be found at [nano.gov](http://nano.gov) or by calling (703) 292-8626.

**SUPPLEMENTARY INFORMATION:** The National Nanotechnology Coordination Office is interested in responses that address one or more of the following Questions below that are

broadly categorized under Standards, Testing, Manufacturing, Commercialization, and Regulation. When submitting your response, please indicate the question(s) you are answering. Please be specific and concise.

### **Background Information**

The National Nanotechnology Initiative (NNI) is a U.S. Government research and development (R&D) initiative of 20 Federal departments, independent agencies, and independent commissions (hereafter referred to as ‘agencies’) working together toward the common challenging vision of a future in which the ability to understand and control matter at the nanoscale leads to a revolution in technology and industry that benefits society. The combined, coordinated efforts of these agencies have accelerated discovery, development, and deployment of nanotechnology towards agency missions and the broader national interest. Established in 2001, the NNI involves nanotechnology-related activities by the 20 member agencies.

The NNI is managed within the framework of the National Science and Technology Council (NSTC), the Cabinet-level council by which the President coordinates science and technology across the Federal Government and interfaces with other sectors. The Nanoscale Science, Engineering, and Technology (NSET) Subcommittee of the NSTC coordinates planning, budgeting, program implementation, and review of the NNI. The NSET Subcommittee is composed of senior representatives from agencies participating in the NNI (<http://www.nano.gov>).

The Federal agencies participating in the NNI have identified focused areas of national importance that may be more rapidly advanced through enhanced coordination and collaboration of agency research and development efforts. These Nanotechnology Signature Initiatives (NSIs) provide a spotlight on critical areas and define the shared vision of the participating agencies for accelerating the advancement of nanoscale science and technology to address needs and exploit opportunities from research through commercialization.

The Nanotechnology Signature Initiative ‘Nanotechnology for Sensors and Sensors for Nanotechnology: Improving and Protecting Health, Safety, and the Environment’ was launched in July of 2012 and includes activities from the following collaborating agencies: Consumer Product Safety Commission; Department of Agriculture (National Institute of Food and Agriculture); Department of Commerce (National Institute of Standards and Technology); Department of Defense (Defense Threat Reduction Agency); Department of Health and Human Services (Food and Drug Administration, National Institutes of Health, and National Institute for Occupational Safety and Health); Environmental Protection Agency; National Aeronautics and Space Administration; and National Science Foundation.

The Sensors NSI addresses both the opportunity of using nanotechnology to advance sensor development and the challenges of developing sensors to keep pace with the increasingly widespread use of engineered nanomaterials. This signature initiative builds upon existing NNI member agency efforts to support research on nanomaterial properties and development of supporting technologies that enable next-generation sensing of biological, chemical, and nanoscale materials. This interagency effort coordinates and stimulates creation of the

knowledge, tools, and methods necessary to develop and test nanosensors and to track the fate of engineered nanomaterials in the body, consumer products, the workplace, and the environment.

The Sensors NSI will accomplish these objectives by means of two major thrusts to:

1. Develop and promote adoption of new technologies that employ nanoscale materials and features and the size-dependent properties of engineered nanomaterials to overcome technical barriers associated with conventional sensors, focusing on three goals:
  - 1.1. Support research on nanomaterials and nanoscale device components to enable the next generation of sensors, including tunable, label-free, and enzymatic sensors
  - 1.2. Support development of integrated and portable sensor devices, including information systems support for collection, analysis, and transfer of large amounts of sensor data
  - 1.3. Accelerate commercialization and expand the application base of existing nanosensor technologies
2. Develop methods and devices to detect and identify engineered nanomaterials across their life-cycles in order to assess their potential impact on health, safety, and the environment, focusing on three goals:
  - 2.1. Identify and quantify unique magnetic, optical, and electronic signatures of nanomaterials in specific matrices with minimal sample preparation
  - 2.2. Identify “surrogate” indicators of nanomaterial presence
  - 2.3. Design and develop “tags” for nanomaterials that will enable their detection and measurement if released into the environment

## **Questions**

The National Nanotechnology Coordination Office seeks public comments in response to the following questions:

A. Standards

- A1. What existing standards have helped to improve or illustrate sensor performance in meeting desired specifications?
- A2. What existing standards have helped to improve the manufacturing of sensors (statistical process control)?
- A3. What standards need to be developed (for performance or manufacturing) to meet industry/consumer expectations for emerging sensor technologies?

B. Testing

- B1. How are you evaluating sensor performance?
- B2. What facilities for standardized testing (e.g., testbeds) have you used to develop nanosensors?
- B3. How did the testbed (formal or informal) help to improve sensor performance or manufacturability?
- B4. What additional testing facilities would aid the sensor development community?
- B5. What capabilities would be highest priority if new sensor testing facilities were to be developed?
- B6. What sample types have you utilized to develop convincing demonstrations of sensor performance (e.g., real clinical samples, environmental samples/sites) and how were these samples obtained?

C. Manufacturing

- C1. What are the largest technical challenges in scale up and manufacturing facing sensor development (e.g., integration, reliability)?
- C2. What are the new tools for integration/engineering (e.g., Wi-Fi, programmable logic, signal processing software, etc.) that will have the greatest impact on sensor commercialization?
- C3. What, if any, unique workforce issues might be expected for sensor manufacturing (e.g., cross-trained integrators/engineers, etc.)?

D. Commercialization

- D1. What are the commercial applications where nanosensors will likely have the most immediate impact?
- D2. What are the primary contributing factors to the existence of a “valley of death” for sensor development and commercialization (e.g., reliability, potential market size, investment capital, etc.)?

E. Regulation

- E1. How can regulatory requirements be best shared with the sensors community?

Responses to this notice are not offers and cannot be accepted by the Government to form a binding contract or issue a grant. Information obtained as a result of this RFI may be used by the government for program planning on a non-attribution basis. Please do not include any

information that might be considered proprietary, confidential, or personally identifying (such as home address or social security number).

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Ted Wackler, Deputy Chief of Staff and Assistant Director

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