

## Special Notice 15-SN -0002

### Special Program Announcement for the Office of Naval Research

#### Research Opportunity: Select Topics in Nanoscience and Nanotechnology

##### I. INTRODUCTION:

This announcement describes a research thrust, entitled “Select Topics in Nanoscience and Nanotechnology” to be launched under the ONRBAA15-001, Long Range Broad Agency Announcement for Navy and Marine Corps Science and Technology which can be found at <http://www.onr.navy.mil/~media/Files/Funding-Announcements/BAA/2015/15-001.ashx> . The research opportunity described in this announcement specifically falls under the following sections of ONRBAA15-001:

Topic #1- Self-Assembly Error Detection and Analysis in Complex DNA Nanostructures:  
Section I, entitled “General Information”, sub-section F, entitled “Research Opportunity Description”, the “Warfighter Performance (Code 34)” item, paragraph 2), listed C “Biomaterials and Bionanotechnology”

Topic #2 – Electric Field Assisted Sintering of Ceramics:  
Section I, entitled “General Information”, sub-section F, entitled “Research Opportunity Description”, the “Sea Warfare and Weapons Department (Code 33)” item, paragraph 2), subparagraph b, entitled “Structural Materials”.

Topic #3 - Low Cost, Large Area Processing of Silicon Based Thin Film Solar Cells:  
Section I, entitled “General Information”, sub-section 6, entitled “Research Opportunity Description”, the “Sea Warfare and Weapons Department (Code 33)” item, paragraph 2), subparagraph a, entitled “Functional Materials”.

ONR anticipates only **grants** will be issued for this effort. The submission of proposals, their evaluation and the placement of research grants will be carried out as described in that Broad Agency Announcement.

The purpose of this announcement is to focus the attention of the scientific community on (1) the area to be studied, (2) stimulate dialogue amongst those interested in this arena, and (3) the planned timetable for the submission of white papers and proposals. ONR’s *objective* is to encourage research and innovation in these selected topic areas and foster technology transition that benefit future war-fighters and meet Navy needs.

##### II. TOPIC DESCRIPTION:

###### Background:

The selected topics in this special notice are designed to address research and technology gaps in the area of nanoscience and nanotechnology in ONR’s current program portfolio. The program Special Notice: 15-SN-0002 will pursue fundamental research in several specific topics that complement and enhance existing programs in related areas.

###### Objective:

The Office of Naval Research (ONR) is interested in receiving proposals on the following research topics:

Topic #1- Self-Assembly Error Detection and Analysis in Complex DNA Nanostructures

Topic #2 - Electric Field Assisted Sintering of Ceramics

Topic #3 - Low Cost, Large Area Processing of Silicon Based Thin Film Solar Cells

The program will address technical challenges in each of the selected areas.

**A. Program Focus and Scope:**

Topic #1 - Self-Assembly Error Detection and Analysis in Complex DNA Nanostructures:

Molecular self-assembly with DNA is an attractive approach to creating nanoscale devices given the range of DNA nanostructures that can be designed and built (e.g. periodic, aperiodic, two-dimensional, three-dimensional, and reconfigurable nanostructures), and the ability of DNA nanostructures to precisely organize heteroelements (e.g. proteins, peptides, nanoparticles, and carbon nanotubes). Some of the technological applications of DNA nanostructures and DNA nanostructure-based devices that have already been explored include shape controlled synthesis of inorganic materials, macromolecular structure determination, templating of functional enzyme systems, single molecule sensing with nanopores or nanobarcodes, plasmonic metamaterials, and “smart” medical devices that deliver drugs selectively to disease sites. The process of DNA self-assembly has error, though, and experimental feedback on the structure and composition of DNA nanostructures will be required to develop robust design principles minimizing DNA self-assembly defects if the full potential of DNA-based nanostructure-devices is to be realized. The standard methods of imaging single DNA nanostructures at multiple nanometer resolution by atomic force microscopy or transmission electron microscopy are insufficient to resolve defects. The objective of this program is to develop a high-throughput approach for the atomic-resolution structural analysis of DNA nanostructures.

Topic #2 – Electric Field Assisted Sintering of Ceramics:

Flash sintering, the sintering of ceramics (including Nanoceramics) by application of an electric field during the sintering process, results in very rapid densification at greatly reduced temperatures, as well as enhanced sintering of very difficult to process materials such as  $B_4C$  and  $ZrB_2$ . At this point, we have a commercially viable field-enhanced sintering process with a large volume of empirical evidence to demonstrate the ultra-fast, low temperature, pressureless sintering of ceramics. Our lack of quantitative understanding of the fundamental physical mechanisms involved hampers our use of this process by industry for both DoD and civilian applications. At this time, it is not possible to predict what ceramics one can process or what fields (or currents) and temperatures one might require. The objective of this project is to develop and validate a high-fidelity model for the effect of applied electric fields and/or currents on mass transport in a powder compact of complex (that is non-trivial) geometry. The ability of the model to predict the required conditions for flash sintering and to explain the unprecedented high diffusion rates created will define success of the project.

### Topic #3 Low Cost, Large Area Processing of Silicon Based Thin Film Solar Cells:

The Navy has interest in lightweight, flexible, robust, low cost photovoltaics and has a basic research program centered around organic photovoltaics, though other low cost approaches have been considered. Thin film silicon cells have shown promise as robust flexible solar cells but cost and performance are lacking. PECVD manufacturing allows large area processing but not at a desirable cost point. The Navy is soliciting white papers for basic research into alternative approaches, possibly with liquid or polymeric silicon precursors, towards low cost, large area processing of silicon based thin film solar cells. In this topic area we are soliciting only white papers to fund seed grant(s) in this area. White papers should provide significant details on the technical feasibility of the approach and the potential for this approach to compete, in terms of cost and performance, with other thin film and silicon-based approaches.

### **III. There will be no workshops, industry days or webinars.**

### **IV. WHITE PAPER SUBMISSION**

Although not required, except in Topic 3, white papers are strongly encouraged for all offerors seeking funding. Each white paper will be evaluated by the Government to determine whether the technology advancement proposed appears to be of particular value to the Department of the Navy. Initial Government evaluations and feedback will be issued via e-mail notification from the Technical Point of Contact. The initial white paper appraisal is intended to give entities a sense of whether their concepts are likely to be funded.

Detailed Full Proposal (Technical and Cost volumes) will be subsequently encouraged from those Offerors whose proposed technologies have been identified through the above referenced e-mail as being of “particular value” to the Government. However, any such encouragement does not assure a subsequent award. Full Proposals may also be submitted by any offeror whose white paper was not identified as being of particular value to the Government or any offeror who did not submit a white paper.

For white papers that propose efforts that are considered of particular value to the Navy but either exceed available budgets or contain certain tasks or applications that are not desired by the Navy, ONR may suggest a full proposal with reduced effort to fit within expected available budgets or an effort that refocuses the tasks or application of the technology to maximize the benefit to the Navy.

White papers should not exceed 4 single-sided pages, exclusive of cover page and resume of principal investigator, and should be in 12-point Times New Roman font with margins not less than one inch. White papers shall be in Adobe PDF format (preferred) or in Microsoft Word format compatible with MS Office 2007.

The cover page should be labeled “White Paper for ONR Research Opportunity: Special Topics in Nanoscience and Nanotechnology and include the following information: title of the proposed effort, technical point of contact, telephone number, fax numbers, and e-mail address.

The 4-page body of the white paper should include the following information:

- (1) Principal Investigator;
- (2) Relevance of the proposed effort to the research areas described in Section II;
- (3) Technical objective of the proposed effort;
- (4) Technical approach that will be pursued to meet the objective;
- (5) A summary of recent relevant technical breakthroughs; and
- (6) A funding plan showing requested funding per fiscal year.

A resume of the principal investigator, not to exceed 1 page, should also be included after the 4-page body of the white paper. To ensure full, timely consideration for funding, white papers should be submitted **no later than December 11, 2014**. White papers received after that date will be considered as time and availability of funding permit. The planned date for completing the review of white papers is **January 8, 2015**.

Electronic (email) submissions should be sent to the attention of the TPOC at: Email Address of the TPOC, e.g. [Jane.Doe@navy.mil](mailto:Jane.Doe@navy.mil). The subject line of the email shall read "15-SN-0002 White Paper Submission". The white paper must be a Microsoft Word 2007 compatible, or PDF format attachment to the email. There is an email size limit of 5MB per email.

NOTE: Do not send:

- 1) Hardcopies of White Papers (including Facsimiles) as only electronic submissions will be accepted and reviewed;
- 2) ZIP files; and
- 3) Password protected files.

## **V. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION**

Full proposals for grants should be submitted in accordance with the requirement of the FY 15 Long Range BAA, ONRBAA 15-001 by **February 26, 2015**. Full proposals must be submitted through [www.grants.gov](http://www.grants.gov). Full Proposals received after that date will be considered as time and availability of funding permit. The following information must be completed as follows in the SF 424 to ensure that the application is directed to the correct individual for review:

Block 4a, Federal Identifier: Enter "N00014"

Block 4b, Agency Routing Number: Enter the three (3) digit Program Office Code and the Program Officer's name as shown below:

Topic #1: "342 (Laura Kienker)"

Topic #2: "332 (William Mullins)"

Topic #3: "332 (Paul Armistead)"

All attachments to the application should also include this identifier to ensure the proposal and its attachments are received by the appropriate Program Office.

## **ANTICIPATED FUNDING:**

### Topic #1:

ONR plans to fund up to one (1) grant with an approximate not-to-exceed value of \$900,000 for a total period of performance of 36 months with a maximum number of team members not-to-exceed three (3) unique entities. NOTE: Lower funding amounts will be considered.

### Topic #2:

ONR plans to fund up to two (2) grants that will typically average \$450,000 for a total period of performance of 24 months. There is no maximum number of team members for each award. NOTE: Higher or lower amounts will also be considered.

### Topic #3:

It is anticipated that two (2) seed grants will be funded at \$170,000.00 per year for two years.

Funding decisions are anticipated to be made by **April 2, 2015**. Although ONR expects the above described program plan to be executed, ONR reserves the right to make changes,

## **VI. SIGNIFICANT DATES AND TIMES**

Recommended White Paper Due Date: December 11, 2014

Recommended Full Proposals Submissions: February 26, 2015

Estimated Date of Award: August- September, 2015

\*Note: These are approximate dates.

## **VII. POINTS OF CONTACT**

In addition to the points of contact listed in ONRBAA15-001, the specific points of contact for this announcement are listed below:

### Technical Points of Contact:

Topic #1: Dr. Laura Kienker, Program Officer, Code 342, ([laura.kienker@navy.mil](mailto:laura.kienker@navy.mil)).

Topic #2: Dr. William Mullins, Program Officer, Code 332, ([william.m.mullins@navy.mil](mailto:william.m.mullins@navy.mil)).

Topic #3: Dr. Paul Armistead, Program Officer, Code 332, ([paul.armistead@navy.mil](mailto:paul.armistead@navy.mil)).

### Business Point of Contact:

All Topics: Kara Stith, Contract Specialist, Code 252, ([Kara.Stith@navy.mil](mailto:Kara.Stith@navy.mil))

## **VIII. SUBMISSION OF QUESTIONS**

Any questions regarding this announcement must be provided to the Technical Points of Contact and/or the Business Point of Contact listed above. All questions shall be submitted in writing by electronic mail.

Answers to questions submitted in response to this Special Notice will be addressed in the form of an Amendment and will be posted to the following web pages:

- Federal Business Opportunities (FEDBIZOPPS) Webpage – <https://www.fbo.gov/>
- Grants.gov Webpage – <http://www.grants.gov/>
- ONR Special Notice Webpage - <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Special-Notices.aspx>

Questions regarding **White Papers or Full Proposals** should be submitted NLT two weeks before the dates recommended for receipt of White Papers and/or Full Proposals. Title the subject line “15-SN-0002”. Questions after this date may not be answered.