Scalable Nanomanufacturing (SNM)

PROGRAM SOLICITATION
NSF 10-618

National Science Foundation

Directorate for Engineering

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

January 10, 2011

IMPORTANT INFORMATION AND REVISION NOTES

Please be advised that the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) includes guidelines implementing the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. See the PAPP Guide Part I: *Grant Proposal Guide* Chapter II for further information about the implementation of this requirement.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Scalable Nanomanufacturing (SNM)
FY 2011

Synopsis of Program:

The National Science Foundation (NSF) announces a program on collaborative research and education in the area of scalable nanomanufacturing, including the long-term societal implications of the large-scale implementation of nanomanufacturing innovations. This program is in response to and is a component of the National Nanotechnology Initiative Signature Initiative: *Sustainable Nanomanufacturing - Creating the Industries of the Future* (http://www.nano.gov/html/research/NNISigInitSustainableMfrFINALJuly2010.pdf).

Although many nanofabrication techniques have demonstrated the ability to produce relatively small quantities of nanomaterials and devices, the emphasis of this program is research that supports the identification and demonstration of nanomanufacturing processes with high potential to scale to economically and industrially relevant production levels. The mode of support is Nanoscale Interdisciplinary Research Teams (NIRT). Proposals submitted to this program must address at least one, and preferably more than one, of the following interconnected themes:

- Novel processes and techniques for continuous and scalable nanomanufacturing;
- Directed (physical/chemical/biological) self-assembly processes leading to heterogeneous nanostructures with the potential for high-rate production;
- Principles and design methods to produce machines and processes to manufacture nanoscale structures, devices and systems; and/or
- Long-term societal and educational implications of the large-scale production and use of nanomaterials, devices and systems, including the life-cycle analysis of such nanomaterials, devices and systems.

Other research and education projects in nanoscale science and engineering will continue to be supported in the relevant programs and divisions.

Cognizant Program Officer(s):

- Haris Doumanidis, telephone: (703) 292-7557, email: cdoumani@nsf.gov
- Daniel De Kee, ENG/EEC, telephone: (703) 292-8769, email: ddekee@nsf.gov
- Bruce M. Kramer, ENG/CMMI, telephone: (703) 292-5348, email: bkramer@nsf.gov
- Lynnette D. Madsen, MPS/DMR, telephone: (703) 292-4936, email: lmadsen@nsf.gov
- George Maracas, ENG/ECCS, telephone: (703) 292-8339, email: gmaracas@nsf.gov
- Gregory Rorrer, ENG/CBET, telephone: (703) 292-5356, email: grorrer@nsf.gov
- Grace J. Wang, ENG/IIP, telephone: (703) 292-2214, email: jiwang@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 5 to 10

Anticipated Funding Amount: $10,000,000 pending availability of funds

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.

PI Limit:

Principal Investigators must be at the faculty level or equivalent.

Limit on Number of Proposals per Organization: 1

An academic institution – a university, or a campus in a multi-campus university -- may submit no more than one (1) proposal on which it is the lead organization in response to this solicitation. The same organization may be a collaborative partner in any number of other multi-organization group proposals in which it is not the lead. A proposal involving more than one organization must be submitted as a single proposal in which a single award is requested, with the managing principal investigator from the lead organization and subawards administered by the lead organization to any other participating organizations.

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  January 10, 2011

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

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I. INTRODUCTION

A length of one nanometer (one billionth of a meter) approximately defines both the minimum feature size of the smallest human-made devices and the largest dimension of the molecules from which living things are assembled. Nanoscale devices and systems are designed to have novel physical, chemical, and biological properties that derive from their intermediate scale, where transitional properties between molecular and bulk behaviors can be accessed and controlled. While many potentially technologically interesting nanostructures have been identified, these often have been produced using slow and expensive methods with little potential for economical production at commercial scale. Economical methods for the assembly of nanosystems, which have nanostructures and nanodevices as components, are also an element of the topic area. Nanosystems may be created by various synthesis and assembly techniques, including but not limited to combinations of molecular assembly and top-down miniaturization techniques, bio-assembly, networking at the nanoscale and multiscale and hierarchical architectures, robotics on surfaces, modular nanosystems, chemo-mechanical processing of molecular assemblies, and quantum interactions.

Proposals to this topic area should target nanomanufacturing processes with a clear path to eventual commercial viability. We particularly seek proposals that include fundamental research in key, well-defined areas that are compellingly identified as roadblocks to scale-up. Both of these elements should be carefully explained and justified in proposals, since both the scientific novelty and the feasibility of the methods being researched will be important selection factors. Collaborative activities with industrial companies are strongly encouraged and collaborations in which industrial partners develop industrially-relevant test beds where university and company researchers can experiment are particularly encouraged. Therefore, it is highly desirable that such firms be consulted early in the proposal preparation process and that their intellectual contributions are clearly explained in the proposal.

II. PROGRAM DESCRIPTION

This solicitation focuses on four high-risk/high-reward research and education themes, three focusing on nanomanufacturing and the fourth on societal issues associated with continuing advances in nanomanufacturing and the associated increasing use of nanoscale materials, devices and systems.

- ***Novel Processes and Techniques for Continuous and Scalable Nanomanufacturing.*** Research on modeling, simulation, and pilot scale experimentation in support of the integration and scale-up of nanomanufacturing processes. Projects identifying specific technological roadblocks and proposing academic-industry research partnerships to overcome them are particularly encouraged. These may include research efforts inspired by promising fabrication approaches and tools recently demonstrated in industry or academia that likely have wider applicability. Examples of such areas include large area graphene production, roll-to-roll processing and the reliable, high-speed, high-resolution on-line metrology, diagnostics, and adaptive (real-time) control capabilities and the process simulation and design methods needed in nanomanufacturing.
- ***Directed Self-Assembly Processes for the High-Rate Production of Heterogeneous Nanostructures***. Research on creating nanostructures that will self-assemble or can be easily assembled into large-scale nanosystems and systems of such nanosystems. It is anticipated that such systems will comprise discrete elements that are differentiable in composition, structure, dimension, and/or geometry. Processes producing heterogeneous nanostructures by conventional phase separation or multilayer deposition processes are not sought and will not usually meet this requirement.
- ***Principles and Design Methods for Machines and Processes to Manufacture Nanoscale Structures, Devices and Systems***. Research is encouraged on design principles, architectures and construction methods for nanoscale measurement and processing machines and systems, including their energy supply and control. Research in this area anticipates machines with integrated or stand-alone capabilities for the nanometer-scale resolution metrology of three-dimensional objects with 10-100 centimeter dimensions, new tools for sensing, assembling, processing, manipulating, manufacturing and integrating across length scales, new sensing modalities and algorithms for controlling and testing nanostructures and devices, and design automation tools for assembling systems of large numbers of heterogeneous nanocomponents. This research should be strongly grounded in fundamental understanding of nanoscale processes and should integrate novel concepts for measurement, high-rate synthesis and processing, scale integration, and scale-up of nanoscale synthesis and processing methods that derive from such understanding.
- ***Long-Term Societal and Educational Implications of the Large-Scale Production and Use of Nanomaterials, Devices and Systems***. Research proposals submitted in this area are expected to increase understanding, assessment and management of long-term societal change associated with nanoscale science, engineering, and technology. Subjects for examination can include the educational, economic, social, organizational and ethical changes associated with support for,

design of, and results from inventions and innovations in nanomanufacturing. These proposals can focus on any social or behavioral phenomena, alone or in combination, and should relate to the research emphases and findings. Thus, they should include experts in the relevant social, behavioral, or economic sciences and nanoscale science and engineering. Proposers are encouraged to include enhancements to the relevant social or behavioral science infrastructure, and new or improved software, databases, instrumentation or tools are especially welcome. This theme aims at a long-term vision for addressing societal and ethical implications of nanotechnology with special reference to nanomanufacturing.

Proposals that incorporate elements of more than one theme are welcome. Given NSF's strong focus on developing the infrastructure for nanoscale science and engineering, all proposals should address integration of research and education, including course development appropriate to the nature of the project.

NSF does not normally support technical assistance, pilot plant efforts, research requiring security classification, or the development of products for commercial marketing or market research for a particular project or invention. Other research and education projects in nanoscale science and engineering will continue to be supported in the relevant programs divisions and directorates.

III. AWARD INFORMATION

Anticipated Type of Award: Continuing Grant or Standard Grant.

Estimated Number of Awards: 5-10.

Awards will be in the range of $250,000-$500,000 per year for four years, depending on the scope of the work proposed. Grants may be awarded in a variety of sizes and durations. The total request for NSF funding for each project, for all investigators and all organizations, may not exceed $2,000,000. NSF expects to fund approximately 5-10 awards in FY 2011, depending on the quality of submissions and the availability of funds. Anticipated date of awards: May 2011.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.

PI Limit:

Principal Investigators must be at the faculty level or equivalent.

Limit on Number of Proposals per Organization: 1

An academic institution – a university, or a campus in a multi-campus university -- may submit no more than one (1) proposal on which it is the lead organization in response to this solicitation. The same organization may be a collaborative partner in any number of other multi-organization group proposals in which it is not the lead. A proposal involving more than one organization must be submitted as a single proposal in which a single award is requested, with the managing principal investigator from the lead organization and subawards administered by the lead organization to any other participating organizations.

Limit on Number of Proposals per PI:

None Specified

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov

Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

The standard Grant Proposal Guide or NSF Grants.gov Application Guide instructions for proposal preparation apply, with the following modifications.

Collaborative research activities should be described and submitted in a single proposal in which a single award is requested, with subawards administered by the lead organization to any other participating organizations (see GPG section II.D.4.a.). This solicitation encourages team approaches. Budgets for any subawards to different organizations must be included.

Cover Page:

- FastLane Users: Proposers must identify this program solicitation number in the program announcement/solicitation block on the Cover Sheet and select "**Scalable Nanomanufacturing**" from the FastLane org. unit pull-down list. The project title must begin with "**SNM:**"
- Grants.gov Users: The program solicitation number will be pre-populated by Grants.gov on the NSF Grant Application Cover Page. In Field 2, Unit of Consideration, enter 07030000 for the Division Code and 1674 for the Program Code. The project title must begin with "**SNM:**"

Project Summary:

Proposers must indicate in order of priority one (or more) of the four research and education themes described in Section II which the proposal addresses. This must be stated in the last line of the project summary, and it will be used to assist in assignment of the proposal to the most appropriate review panel.

Project Description:

The project description should include a discussion of the management, education and outreach aspects of the project. The proposal should describe the roles to be played by the participating organizations, the responsibilities of the managing PI the activities of associated partners, arrangements for networking, exchange, dissemination of data and results. The managing PI must be from the lead organization. Details on the education, training, and outreach activities planned as part of the project should be included. Opportunities for students to obtain novel research or educational experiences should be detailed, as well as any specific training activities or workshop.

The project description is limited to 15 pages and proposals that exceed the page limitation will be returned without review.

B. Budgetary Information

Cost Sharing: Cost sharing is not required under this solicitation.

Budget Preparation Instructions:

PIs are required to attend the NSF Nanoscale Science and Engineering Grantees Meeting and make a poster or verbal presentation on the project. Budgets should include travel funds for PIs to attend this meeting in the second year and all subsequent years of the award.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  January 10, 2011

D. FastLane / Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

  Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

  Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

- **For Proposals Submitted Via Grants.gov:**

  Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. The Grants.gov's Grant Community User Guide is a comprehensive reference document that provides technical information about Grants.gov. Proposers can download the User Guide as a Microsoft Word document or as a PDF document. The Grants.gov User Guide is available at: http://www.grants.gov/CustomerSupport. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

  Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?
How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?
How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

NSF staff also will give careful consideration to the following in making funding decisions:

Integration of Research and Education
One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities
Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria:

In addition, the following criteria will be used:

- Potential for significant contributions to the advancement of nanomanufacturing in one or more of the four research and education themes:
  - Novel processes and techniques for continuous and scalable nanomanufacturing;
  - Directed (physical/chemical/biological) self-assembly processes leading to heterogeneous nanostructures with the potential for high-rate production;
  - Principles and design methods to produce machines and processes to manufacture nanoscale structures, devices and systems; and/or
  - Long-term societal and educational implications of the large-scale production and use of nanomaterials, devices and systems, including the life-cycle analysis of such nanomaterials, devices and systems;
- Strength of the collaborations planned and degree of interdisciplinarity;
- Value to nanomanufacturing education;
- Appropriateness and likely effectiveness of any proposed collaborations. Proposals will be evaluated not by the number of collaborators, but by the quality of the collaborations; and
- Likely effectiveness of the management plan.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or

decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) publications; and, other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Haris Doumanidis, telephone: (703) 292-7557, email: cdoumani@nsf.gov
- Daniel De Kee, ENG/EEC, telephone: (703) 292-8769, email: ddekee@nsf.gov
- Bruce M. Kramer, ENG/CMMI, telephone: (703) 292-5348, email: bkramer@nsf.gov
- Lynnette D. Madsen, MPS/DMR, telephone: (703) 292-4936, email: lmadsen@nsf.gov
- George Maracas, ENG/ECCS, telephone: (703) 292-8339, email: gmaracas@nsf.gov
- Gregory Rorrer, ENG/CBET, telephone: (703) 292-5356, email: grorrer@nsf.gov
- Grace J. Wang, ENG/IIP, telephone: (703) 292-2214, email: jiwang@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the NSF web site.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

Grant Opportunities for Academic Liasion with Industry (GOALI), NSF 10-580). Grant Opportunities for Academic Liaison with Industry (GOALI) aims to synergize university-industry partnerships by making funds available to support an eclectic mix of industry-university linkages. Special interest is focused on affording the opportunity for:

- interdisciplinary university-industry teams to conduct long-term research projects;
- Faculty, postdoctoral fellows, and students to conduct research and gain experience with production processes in an industrial setting; and
- Industrial scientists and engineers to bring industry's perspective and integrative skills to academe.

This solicitation, previous program solicitations, and additional information concerning related activities such as workshops and publications, including **"The National Nanotechnology Initiative - Supplement to the President's FY 2011 Budget"** (2010) prepared by the National Science and Technology Council, are available on-line at http://www.nsf.gov/nano and http://nano.gov/.

To accelerate nanotechnology development in support of the President's priorities and innovation strategy, in accordance with the recommendations of the President's Council of Advisors on Science and technology (PCAST), NNI member agencies have identified areas ripe for significant advances through close and targeted program-level interagency collaboration. The resulting Nanotechnology Signature Initiatives include **"Sustainable Nanomanufacturing," "Nanoelectronics for 2020 and Beyond," and "Nanotechnology for Solar Energy Collection and Conversion."** All three publications are available at (http://www.nano.gov/html/research/signature_initiatives.html). This program solicitation is a partial contribution to those two NNI, National Science and Technology Council, initiatives.

The PCAST report, **"The National Nanotechnology Initiative 2010: Third Assessment and Recommendations of the National Nanotechnology Advisory Panel,"** is available at http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-nano-report.pdf.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

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PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records, " 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
Arlington, VA 22230