

March 15, 2012

**ANNOUNCEMENT OF FEDERAL FUNDING OPPORTUNITY (FFO)
NIST Consortium for Post-Complementary Metal Oxide Semiconductor (CMOS)
Nanoelectronics Research Grant Program**

EXECUTIVE SUMMARY

- **Federal Agency Name:** National Institute of Standards and Technology (NIST), United States Department of Commerce (DoC)
- **Funding Opportunity Title:** NIST Consortium for Post-Complementary Metal Oxide Semiconductor (CMOS) Nanoelectronics Research Grant Program
- **Announcement Type:** Initial
- **Funding Opportunity Number:** 2012-NIST-POST-CMOS-01
- **Catalog of Federal Domestic Assistance (CFDA) Number:** 11.609, Measurement and Engineering Research and Standards
- **Dates:** Proposals, paper and electronic, must be received no later than 5:00 p.m. Eastern Time on Monday, April 16, 2012. Proposals received after this deadline will not be reviewed or considered. Review of proposals, selection of the successful proposer, and award processing is expected to be completed in July 2012. The earliest anticipated start date for the award made under this FFO is expected to be October 1, 2012.
- **Proposal Submission Address:**

Paper Submission: Sharon Cook
National Institute of Standards and Technology
NIST Consortium for Post-CMOS Nanoelectronics Research
Grant Program
100 Bureau Drive, Mail Stop 8120
Gaithersburg, MD 20899-8120

Phone: 301-975-4514

Electronic Submission: www.grants.gov

- **Funding Opportunity Description:** NIST is soliciting proposals for financial assistance from eligible proposers to support basic research focused on the long-term research needs of industry in the area of post-CMOS nanoelectronics. There is a critical need to create novel nanoelectronics technologies that operate at low energies and that can outperform today's CMOS technologies. These technologies should include innovative device, circuit, and architecture approaches which can involve logic, memory, sensors, or analog components.
- **Total Amount to be Awarded:** Approximately \$2,600,000 in Federal funds may be available to fund the first year of a new multi-year award.

- **Anticipated Amounts:** NIST anticipates funding one (1) project award for up to five (5) years, consistent with the multi-year funding policy described in Section II. Award Information, of this FFO.
- **Funding Instrument:** Cooperative agreement.
- **Who Is Eligible:** Accredited institutions of higher education and non-profit organizations located in the United States and its territories. An eligible organization is expected to create a consortium or be part of an existing consortium as described in Section I. Funding Opportunity Description of this FFO.
- **Cost Sharing Requirements:** The Program requires a non-Federal cost share of 25 percent of the yearly total allowable project costs.

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
I. Funding Opportunity Description.....	2
II. Award Information....	4
III. Eligibility....	5
IV. Application/Proposal and Submission Information.....	6
V. Application/Proposal Review Information.....	12
VI. Award Administration Information ...	14
VII. Agency Contacts...	20

FULL ANNOUNCEMENT TEXT

I. Funding Opportunity Description

The statutory authority for the NIST Consortium for Post-CMOS Nanoelectronics Research Grant Program is 15 U.S.C. Sec. 3705. Under this authority, NIST supports cooperative technological innovation activities of industry and universities and development of the generic research base, which may result in significant economic and strategic benefits to the United States.

One area where a clear long-term technological challenge resides is in the development of new semiconductor technology. Within 10 to 15 years the semiconductor industry will approach the limits of existing complementary metal oxide semiconductor (CMOS) technology, as atomic-scale barriers limit the density of components that can be placed on a single chip. The semiconductor industry is well aware of this barrier and, through the International Technology Roadmap for Semiconductors (ITRS), <http://www.itrs.net/>, has identified research on post-CMOS technologies as a high priority. In particular, the field of nanoscale electronics (often referred to as nanoelectronics) presents a number of promising research alternatives.

NIST seeks to support a program that involves an industry-guided partnership that can include commercial, academic, non-profit, and/or government organizations to address the technical challenges highlighted in the ITRS roadmap. These challenges include the characterization and measurement techniques needed to develop novel nanoelectronic technologies that can

demonstrate advantages over CMOS in power, density, performance, or cost. These technologies should include device, circuit, and architecture approaches in achieving the goals of low energy and high functionality. Non-conventional devices can include logic, memory, sensor, and analog components.

Industry is expected to play a guiding role in technical participation, advice, financial support, and other contributions to the partnership described in this section of the FFO. NIST will leverage Federal financial support with that of industry and other partners to increase the strategic investment in such a partnership by funding the recipient. Accordingly, the recipient is expected to be involved in an existing consortium, or create a new consortium, considered for purposes of this program to be an existing or new agreement, combination, or group formed to undertake an enterprise beyond the resources of any one member.¹ The consortium is expected to fund research at universities on post-CMOS technologies.

Specifically, the consortium is expected to create a process for the review, selection, award, monitoring, and evaluation of research and development sub-awards to universities to be made by the consortium in support of addressing the technical challenges associated with nanoscale electronics and the development of non-conventional, low energy technologies which can outperform CMOS in the next decade. The recipient is expected to manage any funded consortium partners and university research supported by the Federal award via ordinary funding instruments, that is, sub-awards and/or contracts.

The technical scope of the consortium should explore fundamentally new approaches to low energy devices and technologies which can outperform traditional CMOS technologies. Topics of interest include:

1. devices that utilize alternative state vectors for manipulating information such as collective effects, spin, magnetics, etc.;
2. devices with higher computational density such as high logic efficiency, re-configurability, etc.;
3. novel architectures that can exploit the non-conventional device behavior that manages information flow such as in non-Boolean and analog behavior;
4. novel interconnect approaches; and
5. non-equilibrium systems that have better noise immunity and low energy operation such as with phonon engineering.

The semiconductor and information technology industries are major drivers of today's modern economies and have accounted for a large proportion of the productivity gains that have characterized the global economy since the 1990s.² Semiconductors are America's largest export product, averaging \$48 billion per year in international sales according to the Semiconductor Industry Association (SIA). In 2010, U.S. semiconductor companies generated \$144 billion in sales, and 6 million American jobs are made possible by the semiconductor industry.³ Advances in the semiconductor and information technology industries have been

¹ <http://www.merriam-webster.com/dictionary/consortium>

² National Nanotechnology Initiative Signature Initiative for FY2011: Nanoelectronics for 2020 and Beyond.

³ The Semiconductor Industry Association: <http://www.sia-online.org/about/about-the-semiconductor-industry-association/>

driven by *Moore's Law*, a highly successful observation predicting exponential increase in the performance of computing devices for the last 40 years⁴.

The ever-increasing miniaturization of semiconductor processing and memory devices has driven gains such as increased processing speed, reduced device switching energy, increased system functionality, and reduced manufacturing cost per bit. Miniaturization is now approaching fundamental limits as the dimensions of critical elements of devices approach atomic size because quantum tunneling and other quantum effects degrade and ultimately prohibit conventional device operation.

Candidate approaches for overcoming these physical limitations include logic based on information-carrying variables other than electron charge such as electron spin, photon polarization, and position and states of atoms and molecules and different types of computing architectures such as cellular automata or three-dimensional spatial structures. Approaches based on nanoscale science, engineering, and technology are the most promising for realizing these radical changes and are expected to change the very nature of electronics and the essence of how electronic devices are manufactured.

Federal investments such as this program may help spur the post-CMOS nanoelectronics research base to develop to a point where significant technological innovations may occur without Federal support. Domestic R&D successes in these areas are critical to maintaining U.S. economic competitiveness in the 21st century's information-based commerce.

II. Award Information

1. Funding Instrument

The funding instrument that will be used is a cooperative agreement. The nature of NIST's "substantial involvement" will generally be collaboration between NIST and the recipient organization. This includes NIST collaboration with a recipient on the scope of work. NIST will be involved in the project selection and funding decisions of the consortium, both in the form of technical expertise, and as an equal and contributing partner on the consortium's steering body. NIST will also provide technical expertise and the opportunity for research collaborations focused on specific research issues related to the metrology and characterization of nanoscale components. Additional forms of substantial involvement that may arise are described in the Department of Commerce (DoC) Grants and Cooperative Agreements Interim Manual, which is available at

http://www.osec.doc.gov/oam/grants_management/policy/doc_grants_manual/default.htm.

2. Multi-Year Funding Policy

When a proposal for a multi-year award is approved, funding will usually be provided for only the first year of the program. If a project is selected for funding, NIST has no obligation to provide any additional funding in connection with that award. Continuation of an award to increase funding or extend the period of performance is at the sole discretion of NIST. Continued funding will be contingent upon satisfactory performance, continued relevance to the mission and priorities of the NIST Consortium for Post-CMOS Nanoelectronics Research Grant

⁴ Gordon E. Moore, "Cramming more components onto integrated circuits," *Electronics*, Vol. 38, Num. 8, April 19, 1965.

Program, and the availability of funds.

3. Funding Availability

NIST plans that a total of \$2,600,000 may be made available in FY 2012 to award one (1) multi-year award to an eligible proposer for the first year. A new award is expected to be made in the amount of approximately \$2,600,000 with a project performance period of up to five (5) years, consistent with the multi-year funding policy described in Section II. Award Information, of this FFO. Therefore, proposers may propose multi-year projects for up to five (5) years in the range of approximately \$2,400,000 to \$2,600,000 per year.

III. Eligibility Information

1. Eligible Proposers

Accredited institutions of higher education and non-profit organizations located in the United States and its territories. An eligible organization is expected to create a consortium or be part of an existing consortium as described in Section I, Funding Opportunity Description of this FFO.

2. Cost Sharing or Matching

Non-Federal cost sharing of 25 percent of the yearly total allowable project costs is required. Cost sharing does not include unallowable/ineligible costs. Proposals that do not provide for the required non-Federal cost sharing will be considered non-responsive and will not receive further review.

Non-Federal cost sharing is that portion of the project costs not borne by the Federal Government. Non-Federal cost share may consist of either, or a combination of, cash or third party in-kind contributions (*i.e.*, non-cash items such as equipment that is an integral part of the building's structure and materials and supplies). Cash may be contributed by the proposer/award recipient, state, county, city, or other non-Federal sources. Third party in-kind contributions may be made by any non-Federal third party (not the award recipient) sources, *e.g.*, state, county, and/or city. The purchase of or third party in-kind contribution of land may not be used as non-Federal cost sharing. In addition, funds from other Federal financial assistance awards may not be used as non-Federal cost sharing under a Consortium for Post-CMOS Nanoelectronics Research Grant Program award, unless authorized by statute. See *also* Section IV.5., Funding Restrictions, of this FFO.

All non-Federal cost share contributions require a letter of commitment signed by an authorized official from each source.

Any cost sharing must be in accordance with the "cost sharing or matching" provisions of 15 C.F.R. part 14, *Uniform Administrative Requirements for Grants and Cooperative Agreements with Institutions of Higher Education, Hospitals, Other Non-Profit, and Commercial Organizations*.

As with the Federal share, any proposed costs included as non-Federal cost sharing must be an allowable/eligible cost under this Program and the following applicable Federal cost principles: 1) Institutions of Higher Education: 2 C.F.R. part 220 (OMB Circular A-21); and 2) Nonprofit Organizations: 2 C.F.R. part 230 (OMB Circular A-122).

As with the Federal share, non-Federal cost sharing will be made a part of the award and will be subject to audit if the project receives funding.

Consistent with the Funding Opportunity Description in Section I. of this FFO, a proposer's project-related activities are likely to exceed the total project costs proposed on the SF-424A, Budget Information – Non-Construction Programs. If actual allowable costs are greater than the total approved budget, the Federal share shall not exceed the total Federal dollar amount authorized by the award. For administrative efficiency, proposers' proposed non-Federal cost share should only be 25% of the yearly total allowable project costs.

3. Other

Pre-Proposals. NIST is not accepting pre-proposals or white papers under this FFO.

IV. Application/Proposal and Submission Information

1. Address to Request Application Package

The standard application package, consisting of the standard forms, i.e., SF-424, SF-424A, SF-424B, SF-LLL, and the CD-511, is available at www.grants.gov. The standard application package may be requested by contacting:

Sharon Cook
National Institute of Standards and Technology
NIST Consortium for Post-CMOS Nanoelectronics Research Program
100 Bureau Drive, Mail Stop 8120
Gaithersburg, MD 20899-8120

Phone: 301-975-4514

2. Content and Format of Application/Proposal Submission

a. Required Proposal Forms and Documents

Proposals must contain the following:

- (1) SF-424, Application for Federal Assistance. The SF-424 must be signed by an authorized representative of the proposer organization. The FFO number 2012-NIST-POST-CMOS-01 must be identified in item 12 of the SF-424. The list of certifications and assurances referenced in item 21 of the SF-424 is contained in the SF-424B.
- (2) SF-424A, Budget Information - Non-Construction Programs. (The budget should reflect anticipated expenses for each year of the project of no more than five (5) years, considering all potential cost increases, including cost of living adjustments.)
- (3) SF-424B, Assurances - Non-Construction Programs
- (4) CD-511, Certification Regarding Lobbying
- (5) SF-LLL, Disclosure of Lobbying Activities (if applicable)
- (6) Technical Proposal. The Technical Proposal is a word-processed document of no more than fifteen (15) pages responsive to the program description (see Section I. of this FFO) and the evaluation criteria (see Section V.1. of this FFO). It should contain the following information:

(a) Executive Summary. An executive summary of the proposed consortium-based research program, consistent with the evaluation criteria (see Section V.1. of this FFO). The executive summary should not exceed one (1) single-sided page.

(b) Statement of Work. A statement of work that discusses the specific tasks proposed to be performed, including a schedule of measurable events and milestones.

This section should be the primary, but not only, means by which the proposal will be evaluated according to the *Rationality* and *Technical Merit of Contribution* evaluation criteria (see Section V.1. of this FFO).

(c) Experience (Qualifications) and Past Performance, Resource Availability, and Involvement of Industry. A description of the qualifications and proposed operational or management activities of key personnel who will be assigned to work on the proposed project must be provided, including examples of past experience working with state government representatives, industry, academia, independent research organizations, and/or related organizations.

Proposals should also describe how the consortium will manage the funds to support R&D in the area of post-CMOS nanoelectronics. Specifically, proposals must:

- i. Describe the membership of the consortium and give evidence of past performance in managing consortium-based research;
- ii. show that the consortium has a shared technological vision and will address the long-term (10-15 years) basic research needs of industry;
- iii. describe the mechanism used by the consortium to determine research focus areas, select awardees, and disburse funding (including: scopes of work and budgets for each proposed project year, a willingness to fund research on multiple alternative approaches in working with various state, industry, and other sources, how availability of funds will be announced, who will be eligible to receive funding, what evaluation criteria will be applied to proposals in terms of merit and relevance to industry needs, description of the selection process, and mechanisms for avoiding conflict of interest);
- iv. describe the amount and type of industry support available for university-based research in terms of funds, personnel, and equipment available,
- v. describe plans and metrics for evaluating the outputs of the funded proposals,
- vi. describe plans for industry involvement with university researchers that demonstrate meaningful impact on industry;
- vii. describe plans for management and evaluation of its activities, including an intellectual property plan (which should address members of the consortium and potential subtier agreements), potential geographic aspects of the program, such as working with regional innovation clusters; the role of small and mid-sized firms, which is encouraged; and any potential effects upon competition of the activities proposed; and
- viii. describe the proposer's consideration of the following issues: the continuing participation, advice, financial support, and other contributions from the private sector; the potential contribution of the activities proposed to productivity, employment, and economic competitiveness of the United States; and a means to place the activities proposed, to the maximum extent feasible, on a self-sustaining basis.

The breadth of the consortium in terms of the involvement of multiple consortium members will be evaluated. The proposal must illustrate the technical expertise of the consortium members relevant to the application of nanoscale electronics towards the development of fundamentally new approaches to circumvent the inherent thermal limitations for switches based on charge transfer to research on nanoscale electronics.

If the proposed consortium contains university members, a university consortium member may not be involved in selecting itself for a subaward. If the consortium contains university members and non-consortium-member universities that are eligible for subawards, the proposal must describe how the consortium will fairly evaluate research proposals from university researchers outside the original membership of the consortium.

This section should be the primary, but not only, means by which the proposal will be evaluated according to the *Experience and past performance in managing consortium-based research*, *Resource Availability*, and *Involvement of Industry* evaluation criteria (see Section V.1. of this FFO).

- (7) Budget Narrative. There is no set format for the Budget Narrative; however, it should provide a detailed breakdown of each of the object class categories as reflected on the SF-424A. Identify the source, type (i.e., cash or third party in-kind contribution), and amount for each source of the non-Federal cost sharing below:
- (8) Letters of Commitment for Non-Federal Cost Sharing. Letters of commitment from all sources of the non-Federal cost sharing are required. Letters of commitment do not count toward the page limit. General “letters of support” are not required and will be counted toward the page limit for the Technical Proposal if included in the proposal. A summary listing of this support is allowed but will count toward the page limit. It is inappropriate for any Federal employee to provide critique or feedback on project ideas, etc., and it is also inappropriate to ask Federal employees for a letter of support.
- (9) Indirect Cost Rate Agreement. If indirect costs are included in the proposed budget, provide a copy of the approved negotiated agreement if this rate was negotiated with a cognizant Federal audit agency. If the rate was not established by a cognizant Federal audit agency, provide a statement to this effect. Successful proposers will be required to obtain such a rate.

If submitting the proposal electronically via Grants.gov, items IV.2.a.(1) through IV.2.a.(5) above are part of the standard application package in Grants.gov and can be completed through the download application process. Items IV.2.a.(6) through IV.2.b.(9) must be completed and attached by clicking on “Add Attachments” found in item 15 of the SF-424, Application for Federal Assistance. This will create a zip file that allows for transmittal of the documents electronically via Grants.gov. Proposers should carefully follow specific Grants.gov instructions at www.grants.gov to ensure the attachments will be accepted by the Grants.gov system. A receipt from Grants.gov indicating a proposal is received does not provide information about whether attachments have been received.

If submitting a proposal by paper, all of the required proposal documents should be submitted in the order listed above.

b. Proposal Format

- (1) **Double-sided copy.** For paper submissions, print on both sides of the paper (front to back counts as two (2) pages).
- (2) **E-mail submissions.** Will not be accepted.
- (3) **Facsimile submissions (fax).** Will not be accepted.
- (4) **Figures, graphs, images, and pictures.** Should be of a size that is easily readable or viewable and may be landscape orientation.
- (5) **Font.** Easy to read font (10-point minimum). Smaller type may be used in figures and tables but must be clearly legible.
- (6) **Line spacing.** Single-spaced.
- (7) **Margins.** One (1) inch top, bottom, left, and right.
- (8) **Number of paper copies.** For paper submissions, one (1) signed stapled original and two (2) stapled copies. If original proposal is in color, the two (2) copies must also be in color. If submitting electronically via Grants.gov, paper copies are not required.
- (9) **Page layout.** Portrait orientation only except for figures, graphs, images, and pictures (see Section IV.2.b.(4)).
- (10) **Page Limit.** Proposals are limited to fifteen (15) pages.

Page limit includes: Table of contents (if included), Technical Proposal with all required sections, including management information and qualifications, resumes, figures, graphs, tables, images, and pictures.

Page limit excludes: SF-424, Application for Federal Assistance; SF-424A, Budget Information – Non-Construction Programs; SF-424B, Assurances – Non-Construction Programs; SF-LLL, Disclosure of Lobbying Activities; CD-511, Certification Regarding Lobbying; Budget Narrative; and Indirect Cost Rate Agreement.
- (11) **Page numbering.** Number pages sequentially.
- (12) **Paper size.** 21.6 by 27.9 centimeters (8 ½ by 11 inches).
- (13) **Proposal language.** English.
- (14) **Stapled paper submission.** For paper submissions, staple the original signed proposal and each of the two (2) copies securely with one (1) staple in the upper left-hand corner.
- (15) **Typed document.** All proposals, including forms, must be typed.

3. Submission Dates and Times

Proposals must be received by NIST no later than 5:00 p.m. Eastern Time on Monday, April 16, 2012. This deadline applies to all modes of proposal submission, including courier services, express mailing, and electronic.

Proposals not received by the specified due date and time will not be considered and will be returned without review. NIST determines whether proposals submitted by paper have been timely received by the deadline by the date and time receipt they are physically received by NIST at its Gaithersburg, Maryland campus. For electronic proposal submissions via Grants.gov, NIST will consider the date and time stamped on the validation generated by www.grants.gov as the official submission time.

NIST strongly recommends that proposers do not wait until the last minute to submit a proposal. NIST will not make any allowances for late submissions, including but not limited to incomplete Grants.gov registration, delays in mail delivery caused by Federal Government security screening for U.S. Postal Service mail, or for delays by guaranteed express mailing and/or couriers. To avoid any potential processing backlogs due to last minute Grants.gov registrations, proposers are highly encouraged to start their Grants.gov registration process at least four (4) weeks prior to the proposal due date.

Important: All proposers, both electronic and paper submitters, should be aware that adequate time must be factored into proposers' schedules for delivery of their proposal. Submitters of electronic proposals are advised that volume on Grants.gov may be extremely heavy on the deadline date, and if Grants.gov is unable to accept proposals electronically in a timely fashion, proposers are encouraged to exercise their option to submit proposals in paper format. Submitters of paper proposals should allow adequate time to ensure a paper proposal will be received on time, taking into account that Federal Government security screening for U.S. Postal Service mail may delay receipt of mail for up to two (2) weeks and that guaranteed express mailings and/or couriers are not always able to fulfill their guarantees.

In the event of a natural disaster that interferes with timely proposal submissions, NIST may issue an amendment to this FFO to change the proposal submission due date.

4. Executive Order 12372 (Intergovernmental Review of Federal Programs)

Proposals under this Program are not subject to Executive Order 12372.

5. Funding Restrictions

Profit or fee is not an allowable cost.

6. Other Submission Requirements

a. Proposals may be submitted by paper or electronically.

(1) Paper proposals must be submitted in triplicate (an original and two copies) and sent to:

Sharon Cook
National Institute of Standards and Technology

NIST Consortium for Post-CMOS Nanoelectronics Research
Grant Program
100 Bureau Drive, Mail Stop 8120
Gaithersburg, MD 20899-8120

Phone: 301-975-4514

(2) Electronic Submission: www.grants.gov

Submitters of electronic proposals through Grants.gov (www.grants.gov) should carefully follow specific Grants.gov instructions to ensure the attachments will be accepted by the Grants.gov system. A receipt from Grants.gov indicating a proposal is received does not provide information about whether attachments have been received. For further information or questions regarding applying electronically for the 2012-NIST-POST-CMOS-01 announcement, contact Christopher Hunton by phone at 301-975-5718 or by e-mail at christopher.hunton@nist.gov.

Proposers are strongly encouraged to start early and not wait until the approaching due date before logging on and reviewing the instructions for submitting a proposal through Grants.gov. The Grants.gov registration process must be completed before a new registrant can apply electronically. If all goes well, the registration process takes three (3) to five (5) business days. If problems are encountered, the registration process can take up to two (2) weeks or more. Proposers must have a Dun and Bradstreet Data Universal Numbering System (DUNS) number and must be registered with the Federal Central Contractor Registry and with a Credential Provider, as explained on the Grants.gov Web site. After registering, it may take several days or longer from the initial log-on before a new Grants.gov system user can submit a proposal. Only authorized individual(s) will be able to submit the proposal, and the system may need time to process a submitted proposal. Proposers should save and print the proof of submission they receive from Grants.gov. If problems occur while using Grants.gov, the proposer is advised to (a) print any error message received and (b) call Grants.gov directly for immediate assistance. If calling from within the United States or from a U.S. territory, please call 800-518-4726. If calling from a place other than the United States or a U.S. territory, please call 606-545-5035. Assistance from the Grants.gov Help Desk will be available around the clock every day, with the exception of Federal holidays. Help Desk service will resume at 7:00 a.m. Eastern Time the day after Federal holidays. For assistance using Grants.gov, you may also contact support@grants.gov.

Information essential to successful submission of proposals on the Grants.gov system is detailed in the For Applicants section found in red on the left side of the www.grants.gov home page, and all potential proposers should pay close attention to the information contained therein. The *All About Grants*, *Applicant FAQs*, and *Submit Application FAQs* sections found under the Applicant Resources option are particularly important.

Refer to important information in Section IV.3. Submission Dates and Times, to help ensure your proposal is received on time.

- b. Any amendments to this FFO will be announced through Grants.gov. Proposers can sign up for Grants.gov FFO amendments or alternatively may call Sharon Cook at 301-975-4514, to request copies.

V. Application/Proposal Review Information

1. Evaluation Criteria

The evaluation criteria that will be used in evaluating proposals, consistent with Section I., Funding Opportunity Description, and Section IV.2, Content and Format of Application/Proposal Submission of this FFO, are as follows:

- a. Rationality (0 to 20 points).** The coherence of the proposer's approach and the extent to which the proposal effectively addresses scientific and technical issues relevant to the NIST Consortium for Post-CMOS Nanoelectronics Research Program.
- b. Experience and past performance in managing consortium-based research (0 to 20 points).** The demonstrated ability a proposer has to manage multiple R&D projects in a consortium-based setting.
- c. Resources Availability (0 to 20 points).** The extent to which the proposer has access to the necessary facilities and overall support to accomplish project objectives. Factors considered as a whole and not given particular weights within the category include: (1) the degree to which requested resources are appropriate for the proposed project's scope; (2) the quality of organizational resources proposed to be used on the project; (3) the rationality and potential effectiveness of any planned subawards and/or contracts; (4) the plan to obtain and/or leverage additional or external resources or support; (5) the rationality and potential effectiveness of planned proposed collaborations with other stakeholders through the consortium, taking into account regional considerations, if proposed; and (6) the types of costs submitted for applicant's contribution to the budget. Proposals that demonstrate support for R&D in terms of (in order of priority) direct grants for research, salary support for scientists, or access to equipment will receive a higher score than proposals that count overhead or other administrative costs as a part of the consortium's contribution.
- d. Technical Merit of Contribution (0 to 20 points).** The potential technical effectiveness of the proposed work and the value it would contribute to future breakthroughs in nanoelectronics. This includes plans for metrics for evaluating the outputs of the funded proposals.
- e. Involvement of Industry (0 to 20 points).** The extent to which the proposer demonstrates strong and active involvement of industry, including small and mid-sized commercial firms, in setting directions and evaluating the impact on industry of the Research Program.

2. Selection Factors

The Selecting Official shall select proposals for award based upon the rank order of the proposals, and may select a proposal out of rank based on one or more of the following selection factors:

- a. The availability of Federal funds.
- b. The project duplicates other projects funded by DoC or by other Federal agencies.
- c. Proposer's performance under current or previous Federal financial assistance awards.

3. Review and Selection Process

- a. **Initial Administrative Review of Proposals.** An initial review of timely received proposals will be conducted to determine eligibility, completeness, and responsiveness to this FFO and the scope of the stated program objectives. Proposals determined to be ineligible, incomplete, and/or non-responsive may be eliminated from further review.
- b. **Full Review of Eligible, Complete, and Responsive Proposals.** Proposals that are determined to be eligible, complete, and responsive will proceed for full reviews in accordance with the review and selection processes below:
 - (1) **Evaluation/Review and Ranking.** Each proposal will be reviewed by at least three (3) independent, objective reviewers, knowledgeable in the subject matter of this FFO and its objectives and who are able to conduct a review based on the evaluation criteria (see Section V.1. of this FFO). If non-Federal reviewers are used, the reviewers may discuss the proposals with each other, but scores will be determined on an individual basis, not as a consensus. Based on the average of the reviewers' scores, a rank order will be prepared and provided to the Selecting Official for further consideration.
 - (2) **Selection.** The Selecting Official, who is the Deputy Director of the NIST Physical Measurement Laboratory or designee, will then select funding recipients based upon the rank order and the selection factors (see Section V.2. of this FFO).
 - (3) Before making a selection recommendation to the NIST Grants Officer for final award determination, the Selecting Official must make the following findings under 15 U.S.C. Sec. 3705(c) regarding the proposed recipient:
 - (a) consideration has been given to the potential contribution of the activities proposed in the project to productivity, employment, and economic competitiveness of the United States;
 - (b) a high likelihood exists of continuing participation, advice, financial support, and other contributions from the private sector;
 - (c) the host university or other nonprofit institution has a plan for the management and evaluation of the activities proposed within the particular project, including:
 - i. the agreement between the parties as to the allocation of patent rights on a nonexclusive, partially exclusive, or exclusive license basis to and inventions conceived or made under the auspices of the project; and
 - ii. the consideration of means to place the project, to the maximum extent feasible, on a self-sustaining basis;
 - (d) suitable consideration has been given to the university's or other nonprofit institution's capabilities and geographical location; and
 - (e) consideration has been given to any effects upon competition of the activities proposed under the project.

NIST reserves the right to negotiate the budget costs with the proposer that has been selected to receive an award, which may include requesting that the proposer remove certain costs. Additionally, NIST may request that the proposer modify objectives or work plans and provide supplemental information required by the agency prior to award. NIST also reserves the right to reject a proposal where information is uncovered that raises a

reasonable doubt as to the responsibility of the proposer. NIST may select part, some, all, or none of the proposals. The award decisions of the NIST Grants Officer are final.

4. Anticipated Announcement and Award Dates

Review, selection, and award processing is expected to be completed in July 2012. The earliest anticipated start date for the award made under this FFO is expected to be October 1, 2012.

5. Additional Information

- a. Proposal Replacement Pages.** Proposers may not submit replacement pages and/or missing documents once a proposal has been submitted. Any revisions must be made by submission of a new proposal that must be received by NIST by the submission deadline.
- b. Notification to Unsuccessful Proposers.** Unsuccessful proposers will be notified in writing.
- c. Retention of Unsuccessful Proposals.** One (1) of each non-selected proposal will be retained for three (3) years for record keeping purposes and the other two (2) copies will be destroyed. After three (3) years the remaining copy will be destroyed.

VI. Award Administration Information

- 1. Award Notices.** Successful proposers will receive an award from the NIST Grants Officer. The award cover page, i.e., CD-450, Financial Assistance Award, is available at http://ocio.os.doc.gov/s/groups/public/@doc/@os/@ocio/@oitpp/documents/content/dev01_002513.pdf and the DoC Financial Assistance Standard Terms and Conditions (March 2008), which may be updated by the time of award, are available at <http://www.osec.doc.gov/oam/archive/docs/GRANTS/DOC%20STCsMAR08Rev.pdf>.

2. Administrative and National Policy Requirements

- a. DoC Pre-Award Notification Requirements.** The DoC Pre-Award Notification Requirements for Grants and Cooperative Agreements, which are contained in the *Federal Register* notice of February 11, 2008 (73 FR 7696), are applicable to this FFO and are available at <http://www.gpo.gov/fdsys/pkg/FR-2008-02-11/pdf/E8-2482.pdf>.
- b. Employer/Taxpayer Identification Number (EIN/TIN), Dun and Bradstreet Data Universal Numbering System (DUNS), and Central Contractor Registration (CCR).** All proposers for Federal financial assistance are required to obtain a universal identifier in the form of DUNS number and maintain a current registration in the CCR database. On the form SF-424 items 8.b. and 8.c., the proposer's 9-digit EIN/TIN and 9-digit DUNS number must be consistent with the information on the CCR (www.ccr.gov) and Automated Standard Application for Payment System (ASAP). For complex organizations with multiple EIN/TIN and DUNS numbers, the EIN/TIN and DUNS numbers MUST be the numbers for the applying organization. Organizations that provide incorrect/inconsistent EIN/TIN and DUNS numbers may experience significant delays in receiving funds if their proposal is selected for funding. Confirm that the EIN/TIN and DUNS numbers are consistent with the information on the CCR and ASAP.

Per the requirements of 2 C.F.R. Part 25, each proposer must:

- (1) Be registered in the CCR before submitting a proposal;
- (2) Maintain an active CCR registration with current information at all times during which it has an active Federal award or a proposal under consideration by an agency; and
- (3) Provide its DUNS number in each application or proposal it submits to the agency.

See also the *Federal Register* notice published on September 14, 2010, at 75 FR 55671.

- c. Collaborations with NIST Employees.** All proposals should include a description of any work proposed to be performed by an entity other than the proposer, and the cost of such work should ordinarily be included in the budget.

If a proposer proposes collaboration with NIST, the statement of work should include a statement of this intention, a description of the collaboration, and prominently identify the NIST employee(s) involved, if known. Any collaboration by a NIST employee must be approved by appropriate NIST management and is at the sole discretion of NIST. Prior to beginning the merit review process, NIST will verify the approval of the proposed collaboration. Any unapproved collaboration will be stricken from the proposal prior to the merit review.

- d. Use of NIST Intellectual Property.** If the proposer anticipates using any NIST-owned intellectual property to carry out the work proposed, the proposer should identify such intellectual property. This information will be used to ensure that no NIST employee involved in the development of the intellectual property will participate in the review process for that competition. In addition, if the proposer intends to use NIST-owned intellectual property, the proposer must comply with all statutes and regulations governing the licensing of Federal government patents and inventions, described in 35 U.S.C. §§ 200-212, 37 C.F.R. Part 401, 15 C.F.R. § 14.36, and in Section B.21 of the DoC Pre-Award Notification Requirements, 73 FR 7696 (February 11, 2008). Questions about these requirements may be directed to the Chief Counsel for NIST, (301) 975-2803.

Any use of NIST-owned intellectual property by a proposer is at the sole discretion of NIST and will be negotiated on a case-by-case basis if a project is deemed meritorious. The proposer should indicate within the statement of work whether it already has a license to use such intellectual property or whether it intends to seek one.

If any inventions made in whole or in part by a NIST employee arise in the course of an award made pursuant to this FFO, the United States government may retain its ownership rights in any such invention. Licensing or other disposition of NIST's rights in such inventions will be determined solely by NIST, and include the possibility of NIST putting the intellectual property into the public domain.

- e. Research Projects Involving Human Subjects, Human Tissue, Data or Recordings Involving Human Subjects Including Software Testing.** Any proposal that includes research involving human subjects, human tissue/cells, data or recordings involving human subjects, including software testing, must meet the requirements of the Common Rule for the Protection of Human Subjects ("Common Rule"), codified for the Department of Commerce (DoC) at 15 C.F.R. Part 27. In addition, any such application that includes research on these topics must be in compliance with any statutory requirements imposed upon the Department of Health and Human Services (DHHS) and other Federal agencies regarding these topics, all regulatory policies and guidance adopted by DHHS, the Food and

Drug Administration, and other Federal agencies on these topics, and all Executive Orders and Presidential statements of policy on these topics.

NIST reserves the right to make an independent determination of whether an applicant's research involves human subjects. If NIST determines that your research project involves human subjects, you will be required to provide additional information for review and approval. If an award is issued, no research activities involving human subjects shall be initiated or costs incurred under the award until the NIST Grants Officer issues written approval. Retroactive approvals are not permitted.

NIST will accept applications that include research activities involving human subjects that have been or will be approved by an Institutional Review Board (IRB) currently registered with the Office for Human Research Protections (OHRP) within the DHHS and that will be performed by entities possessing a currently valid Federal-wide Assurance (FWA) on file from OHRP that is appropriately linked to the cognizant IRB for the protocol. NIST will not issue a single project assurance (SPA) for any IRB reviewing any human subjects protocol proposed to NIST. Information regarding how to apply for an FWA and register and IRB with OHRP can be found at <http://www.hhs.gov/ohrp/assurances/index.html>.

Generally, NIST does not fund research involving human subjects in foreign countries. NIST will consider, however, the use of **preexisting** tissue, cells, or data from a foreign source on a limited basis if all of the following criteria are satisfied:

- (1) the scientific source is considered unique,
- (2) an equivalent source is unavailable within the United States,
- (3) an alternative approach is not scientifically of equivalent merit, and
- (4) the specific use qualifies for an exemption under the Common Rule.

Any award issued by NIST for the NIST Consortium for Post-Complementary Metal Oxide Semiconductor (CMOS) Nanoelectronics Research Grant Program is required to adhere to all Presidential policies, statutes, guidelines, and regulations regarding the use of human embryonic stem cells. The DoC follows the NIH Guidelines by supporting and conducting research using only human embryonic stem cell lines that have been approved by NIH in accordance with the NIH Guidelines. Detailed information regarding NIH Guidelines for stem cells is located on the NIH Stem Cell Information website: <http://stemcells.nih.gov>. The DoC will not support or conduct any type of research that the NIH Guidelines prohibit NIH from funding. The DoC will review research using human embryonic stem cell lines that it supports and conducts in accordance with the Common Rule and NIST implementing procedures, as appropriate.

Any request to support or conduct research using human embryonic stem cell lines not currently approved by the NIH, will require that the owner, deriver or licensee of the human embryonic stem cell line apply for and receive approval of the registration of the cell line through the established NIH application procedures: http://hescregapp.od.nih.gov/NIH_Form_2890_Login.htm. Due to the timing uncertainty associated with establishing an embryonic stem cell line in the NIH registry, the use of existing human embryonic stem cell lines in the NIH Embryonic Stem Cell Registry may be preferred by applicants or current award recipients. The NIH Embryonic Stem Cell Registry is located at: http://grants.nih.gov/stem_cells/registry/current.htm.

An applicant or current award recipient proposing to use a registered embryonic stem cell line will be required to document an executed agreement for access to the cell line with the provider of the cell line, and acceptance of any established restrictions for use of the cell line, as may be noted in the NIH Embryonic Stem Cell Registry.

If the applicant's proposal includes exempt and/or non-exempt research activities involving human subjects the following information is required in the proposal:

- (1) The name(s) of the institution(s) where the research will be conducted;
- (2) The name(s) and institution(s) of the cognizant IRB(s), and the IRB registration number(s);
- (3) The FWA number of the applicant linked to the cognizant IRB(s);
- (4) The FWAs associated with all organizations engaged in the planned research activity linked to the cognizant IRB;
- (5) If the IRB review(s) is pending, the estimated start date for research involving human subjects;
- (6) The IRB approval date (if currently approved for exempt or non-exempt research);
- (7) If any FWAs or IRB registrations are being applied for, that should be clearly stated.

Additional documentation may be requested, as warranted, during review of the applicant's proposal, but may include the following for research activities involving human subjects that are planned in the first year of the award:

- (1) A signed (by the study principal investigator) copy of each applicable final IRB-approved protocol;
- (2) A signed and dated approval letter from the cognizant IRB(s) that includes the name of the institution housing each applicable IRB, provides the start and end dates for the approval of the research activities, and any IRB-required interim reporting or continuing review requirements;
- (3) A copy of any IRB-required application information, such as documentation of approval of special clearances (i.e., biohazard, HIPAA, etc.) conflict-of-interest letters, or special training requirements;
- (4) A brief description of what portions of the IRB submitted protocol are specifically included in the applicant's proposal submitted to NIST, if the protocol includes tasks not applicable to the proposal, or if the protocol is supported by multiple funding sources. For protocols with multiple funding sources, NIST will not approve the study without a nonduplication-of-funding letter indicating that no other federal funds will be used to support the tasks proposed under the proposed research or ongoing project;
- (5) If a new protocol will only be submitted to an IRB if an award from NIST issued, a draft of the proposed protocol may be requested.
- (6) Any additional clarifying documentation that NIST may request during review of proposals to perform the NIST administrative review of research involving human subjects.

- f. Research Projects Involving Vertebrate Animals.** Any application that includes an undergraduate and/or graduate student's and/or post doctoral associate's participation in research involving live vertebrate animals must be in compliance with the National Research Council's "Guide for the Care and Use of Laboratory Animals," which can be obtained from National Academy Press, 500 5th Street, N.W., Department 285, Washington, DC 20055. In addition, such applications must meet the requirements of the Animal Welfare Act (7 U.S.C. § 2131 et seq.), 9 C.F.R. Parts 1, 2, and 3, and if appropriate, 21 C.F.R. Part 58. These

regulations do not apply to proposed research using **preexisting** images of animals or to research plans that do not include live animals that are being cared for, euthanized, or used by the project participants to accomplish research goals, teaching, or testing. These regulations also do not apply to obtaining animal materials from commercial processors of animal products or to animal cell lines or tissues from tissue banks.

NIST reserves the right to make an independent determination of whether your research involves live vertebrate animals. If NIST determines that your research project involves live vertebrate animals, you will be required to provide additional information for review and approval. If an award is issued, no research activities involving live vertebrate animals subjects shall be initiated or costs incurred under the award until the NIST Grants Officer issues written approval.

If the applicant's proposal includes research activities involving live vertebrate animals the following information is required in the proposal:

- (1) The name(s) of the institution(s) where the animal research will be conducted;
- (2) The assurance type and number, as applicable, for the cognizant IACUC where the research activity is located. [For example: Animal Welfare Assurance from the Office of Laboratory Animal Welfare (OLAW) should be indicated by the OLAW assurance number, i.e. A-1234; an USDA Animal Welfare Act certification should be indicated by the certification number i.e. 12-R-3456; and an Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC) should be indicated by AAALAC.]
- (3) The IACUC approval date (if currently approved);
- (4) If the review by the cognizant Institutional Animal Care and Use Committee (IACUC) is pending, the estimated start date for research involving vertebrate animals;
- (5) If any assurances or IACUCs need to be obtained or established, that should be clearly stated.

Additional documentation will be requested, as warranted, during review of the proposal, but may include the following for research activities involving live vertebrate animals that are planned in the first year of the award:

- (1) A signed (by the Principal Investigator) copy of the IACUC approved Animal Study Proposal (ASP);
- (2) Documentation of the IACUC approval indicating the approval and expiration dates of the ASP; and
- (3) If applicable, a nonduplication-of-funding letter if the ASP is funded from several sources.
- (4) If a new ASP will only be submitted to an IACUC if an award from NIST issued, a draft of the proposed ASP may be requested.
- (5) Any additional clarifying documentation that NIST may request during review of proposals to perform the NIST administrative review of research involving live vertebrate animals.

- g. Funding Availability and Limitation of Liability.** Funding for the program listed in this FFO is contingent upon the availability of appropriations. In no event will NIST or DoC be responsible for proposal preparation costs if this program fails to receive funding or is cancelled because of agency priorities. Publication of this FFO does not oblige NIST or DoC to award any specific project or to obligate any available funds.

- h. Collaborations Making Use of Federal Facilities.** All proposals should include a description of any work proposed to be performed using Federal facilities.

In addition, if a proposer proposes use of NIST facilities, the statement of work should include a statement of this intention and a description of the facilities. Any use of NIST facilities must be approved by appropriate NIST management and is at the sole discretion of NIST. Prior to beginning the merit review process, NIST will verify the availability of the facilities and approval of the proposed usage. Any unapproved facility use will be stricken from the proposal prior to the merit review. Examples of some facilities that may be available for collaborations are listed on the NIST Technology Services Web site, <http://www.nist.gov/user-facilities.cfm>.

3. Reporting

- a. Reporting requirements.** In lieu of the reporting requirements described in sections A.01 Financial Reports and B.01 Performance (Technical) Reports of the DoC Financial Assistance Standard Terms and Conditions dated March 2008 (<http://www.osc.doc.gov/oam/archive/docs/GRANTS/DOC%20STCsMAR08Rev.pdf>), the following reporting requirements shall apply:

(1) Financial Reports. Each award recipient will be required to submit an SF-425, Federal Financial Report in triplicate (an original and two (2) copies), on a quarterly basis for the periods ending March 31, June 30, September 30, and December 31 of each year. Reports will be due within 30 days after the end of the reporting period.

(2) Performance (Technical) Reports. Each award recipient will be required to submit a technical progress report in triplicate (an original and two (2) copies), on a quarterly basis for the periods ending March 31, June 30, September 30, and December 31 of each year. Reports will be due within 30 days after the end of the reporting period. A final technical progress report shall be submitted within 90 days after the expiration date of the award. Two (2) copies of the technical progress report shall be submitted to the Project Manager and the original report to the NIST Grants Officer. Technical progress reports shall contain information as prescribed in 15 C.F.R. § 14.51.

(3) Patent and Property Reports. From time to time, and in accordance with the Uniform Administrative Requirements and other terms and conditions governing the award, the recipient may need to submit property and patent reports.

- b. OMB Circular A-133 Audit Requirements.** Single or program-specific audits shall be performed in accordance with the requirements contained in OMB Circular A-133, "*Audits of States, Local Governments, and Non-Profit Organizations*," and the related *Compliance Supplement*. OMB Circular A-133 requires any non-Federal entity (*i.e.*, including non-profit institutions of higher education and other non-profit organizations) that expends Federal awards of \$500,000 or more in the recipient's fiscal year to conduct a single or program-specific audit in accordance with the requirements set out in the Circular. Proposers are reminded that NIST, the DoC Office of Inspector General or another authorized Federal agency may conduct an audit of an award at any time.
- c. Federal Funding Accountability and Transparency Act of 2006.** In accordance with 2 C.F.R. Part 170, all recipients of a Federal award made on or after October 1, 2010, are required to comply with reporting requirements under the Federal Funding Accountability

and Transparency Act of 2006 (Pub. L. No. 109-282). In general, all recipients are responsible for reporting sub-awards of \$25,000 or more. In addition, recipients that meet certain criteria are responsible for reporting executive compensation. Proposers must ensure they have the necessary processes and systems in place to comply with the reporting requirements should they receive funding. Also see the *Federal Register* notice published September 14, 2010, at 75 FR 55663.

VII. Agency Contact(s)

Subject Area	Point of Contact
Programmatic and technical questions	John Suehle Phone: 301-975-2247 Fax: 301-975-6021 E-mail: john.suehle@nist.gov
Electronic proposal submission through Grants.gov	Christopher Hunton Phone: 301-975-5718 Fax: 301-840-5976 E-mail: christopher.hunton@nist.gov
Grant rules and regulations	James Browning Phone: 301-975-8088 Fax: 301-840-5976 E-mail: james.browning@nist.gov