111TH CONGRESS
1ST SESSION

S. 1482

To reauthorize the 21st Century Nanotechnology Research and Development Act, and for other purposes.

IN THE SENATE OF THE UNITED STATES

JULY 21, 2009

Mr. KERRY (for himself, Ms. SNOWE, Mr. ROCKEFELLER, Mr. PRYOR, and Mr. WYDEN) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

A BILL

To reauthorize the 21st Century Nanotechnology Research and Development Act, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE: TABLE OF CONTENTS; AMENDMENT OF ACT.

This Act may be cited as the ''National Nanotechnology Initiative Amendments Act of 2009''.

(b) TABLE OF CONTENTS.—The table of contents for this Act is as follows:

Sec. 1. Short title; table of contents.
Sec. 2. Enhancements to National Nanotechnology Program.
Sec. 3. Enhancements to National Nanotechnology Program coordination.
Sec. 4. Enhancement of National Nanotechnology Advisory Panel.
Sec. 5. Triennial external review of National Nanotechnology Program.
Sec. 6. Societal dimensions of nanotechnology.

Sec. 7. Transfer of nanotechnology.
Sec. 8. Research in areas of national importance.
Sec. 9. Nanomanufacturing research.
Sec. 10. Nanoscale characterization and metrology.
Sec. 11. Deliberative public input in decisionmaking processes.
Sec. 12. Amendments to definitions.

(c) AMENDMENT OF 21ST CENTURY NANOTECHNOLOGY RESEARCH AND DEVELOPMENT ACT.—Except as otherwise expressly provided, whenever in this Act an amendment or repeal is expressed in terms of an amendment to, or repeal of, a section or other provision, the reference shall be considered to be made to a section or other provision of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501 et seq.).

SEC. 2. ENHANCEMENTS TO NATIONAL NANOTECHNOLOGY PROGRAM.

(a) EXPANSION OF PROGRAM SCOPE.—Section 2(a) (15 U.S.C. 7501(a)) is amended—

(1) by striking ''and'' after the semicolon in paragraph (2);

(2) by striking ''Program.'' in paragraph (3) and inserting ''Program; and''; and

(3) by adding at the end the following:

''(4) sponsor nanotechnology education and workforce development programs, including information on nanotechnology, to prepare scientists, engineers, and technicians to work in nanotechnology;

''(5) fully support the development of standard reference materials and instrumentation, metrology, and computational tools necessary to measure, characterize, and predict the properties of nanoscale materials;

''(6) participate in national and international organizations developing trade, commercialization, and regulatory guidelines, plans, and standards for the safe use of nanotechnology;

''(7) establish and sustain the infrastructure, tools, and instruments to provide cost effective state-of-the-art measurement, characterization, manipulation, and simulations capabilities;

''(8) utilize the perspectives of the industrial community to promote the rapid commercial development of nanoscale-enabled devices, systems, and technologies; and

''(9) coordinate research to determine key physical and chemical characteristics of nanoparticles and nanomaterials that may pose environmental, health, and safety risks.''.

(b) ADDITION OF PROGRAM ACTIVITIES.—

(1) IN GENERAL.—Section 2(b) (15 U.S.C. 7501(b)) is amended—

(A) by redesignating paragraphs (3) through (11) as paragraphs (4) through (12), respectively; and

(B) by inserting after paragraph (2) the following:

''(3) issuing guidance each year to the agencies participating in the Program that—

''(A) prioritizes the Program's research initiatives;

''(B) documents the benefit of the research to the United States;

''(C) describes a clear strategy for transitioning the research into commercial products and technologies; and

''(D) describes how the Program will coordinate or conduct research on the environmental, health, and safety issues related to nanotechnology.''.

(2) CONFORMING AMENDMENTS.—

(A) Section 2(c) (15 U.S.C. 7501(c)) is amended—

(i) in paragraph (7), by striking ''stated in subsection (b)(7)'' and inserting ''stated in subsection (b)(9)''; and

(ii) in paragraph (10), by striking ''pursuant to subsection (b)(10)(D)'' and inserting ''pursuant to subsection (b)(12)(D)''.

(B) Section 2(d) (15 U.S.C. 7501(d)) is amended in paragraphs (1) and (2), by striking ''pursuant to subsection (b)(10)'' each place it occurs and inserting ''pursuant to subsection (b)(12)''.

(C) Section 7(a)(1) (15 U.S.C. 7506(a)(1)) is amended by striking ''under section 2(b)(7)'' and inserting ''under section 2(b)(9)''.

(c) ENHANCEMENT OF PROGRAM MANAGEMENT.—

(1) TRIENNIAL STRATEGIC PLAN.—Section 2(c) (15 U.S.C. 7501(c)) is amended by striking paragraph (4) and inserting the following:

''(4) develop, not later than 1 year after the date of enactment of the National Nanotechnology Initiative Amendments Act of 2009, and update every 3 years thereafter, a strategic plan to guide the Program activities described under subsection (b) that—

''(A) specifies—

''(i) near-term and long-term objectives for the Program;

''(ii) the anticipated time frame for achieving the near-term objectives; and

''(iii) the metrics to be used for assessing progress toward the objectives; and

''(B) describes—

''(i) how the Program will move results out of the laboratory and into applications for the benefit of society, including through cooperation and collaboration with nanotechnology research, development, and technology transition initiatives supported by the States;

''(ii) how the Program will encourage and support interdisciplinary research and development in nanotechnology; and

''(iii) proposed research in areas of national importance in accordance with the requirements of section 12;''.

(2) JOINT INTERAGENCY SOLICITATIONS.—Section 2(c) (15 U.S.C. 7501(c)) is further amended—

(A) by striking ''and'' after the semicolon in paragraph (9);

(B) by redesignating paragraph (10) as paragraph (11);

(C) by inserting after paragraph (9) the following:

''(10) encourage joint interagency solicitation of grant applications in high-priority multi-disciplinary research areas, including—

''(A) instrumentation and metrology equipment to detect, measure, and characterize nanomaterials;

''(B) chemical, biological, and nuclear sensor technology for defense and homeland security applications;

''(C) sustainable energy, environment, water and agriculture;

''(D) long-term health and safety aspects, with a particular focus on the workforce;

''(E) simulation and modeling; and

''(F) manufacturing of complex systems at the nanoscale.''; and

(D) by striking ''through (9)'' and inserting ''through (10)'' in paragraph (11), as redesignated by subparagraph (B).

(d) EXPANSION OF ANNUAL REPORT OF THE NATIONAL SCIENCE AND TECHNOLOGY COUNCIL.—Section 2(d) (15 U.S.C. 7501(d)) is amended—

(1) in paragraph (1), by inserting ''and the previous fiscal year'' after ''current fiscal year'';

(2) in paragraph (4), by striking ''and'';

(3) in paragraph (5), by striking the period at the end and inserting ''; and''; and

(4) by adding at the end the following:

''(6) the research plan required by section 10(b)(1) and updated under section 10(b)(5); and

''(7) a description of research and development areas supported in accordance with section 12, including—

''(A) the budget for such areas for the current and previous fiscal year; and

''(B) the budget for such areas for the next fiscal year.''.

(e) SUPPORT OF STANDARDS SETTING ACTIVITIES.—Section 2 (15 U.S.C. 7501) is amended by adding at the end the following:

''(e) STANDARDS SETTING.—

''(1) IN GENERAL.—The agencies participating in the Program shall fully support the activities of the committees of standards setting bodies involved in the development of standards for nanotechnology.

''(2) REIMBURSEMENT OF TRAVEL COSTS.—The agencies participating in the Program may re-

imburse the travel costs of participants described in paragraph (1).''.

SEC. 3. ENHANCEMENTS TO NATIONAL NANOTECHNOLOGY PROGRAM COORDINATION.

(a) MODIFICATIONS TO FUNDING OF NATIONAL NANOTECHNOLOGY COORDINATION OFFICE.—Section 3(b) of the Act (15 U.S.C. 7502(b)) is amended to read as follows:

''(b) FUNDING.—

''(1) IN GENERAL.—The operation of the National Nanotechnology Coordination Office shall be supported by funds from each agency participating in the Program. The portion of the total budget of the Office provided by each agency for each fiscal year shall be in the same proportion as the agency's share of the total budget for the Program for the previous fiscal year, as specified in the report required under section 2(c)(1).

''(2) STANDARDS RESEARCH.—Of the amounts provided to the Office under paragraph (1), $500,000 shall be made available to the National Institute of Standards and Technology to be used by the Institute, in coordination with the American National Standards Institute, for the development of nanotechnology standards.

''(3) NNCO DATABASE.—There are authorized to be appropriated to the National Science Foundation for use by the National Nanotechnology Coordination Office in developing and maintaining the database required by subsection (d)—

''(A) $1,750,000 for fiscal year 2010;

''(B) $1,000,000 for fiscal year 2011; and

''(C) $750,000 for fiscal year 2012.''.

(b) ANNUAL REPORT ON FUNDING OF THE NATIONAL NANOTECHNOLOGY COORDINATION OFFICE.—Section 3 (15 U.S.C. 7502) is amended by striking subsection (c) and inserting the following:

''(c) ANNUAL REPORT.—The Council shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives each year, together with documents submitted to Congress in support of the budget of the President for the fiscal year beginning in such year (as submitted pursuant to section 1105 of title 31, United States Code), a report containing the following:

''(1) A description of the funding required by the National Nanotechnology Coordination Office to perform the functions specified in subsection (a) for the next fiscal year set forth by category of activity,

including the funding required to carry out the requirements of—

"(A) section 2(b)(12)(D);

"(B) subsection (d) of this section; and

"(C) section 5.

"(2) A description of the funding required by such Office to perform the functions specified in subsection (a) for the current fiscal year set forth by category of activity, including the funding required to carry out the requirements of subsection (d).

"(3) The amount of funding provided for such Office for the current fiscal year set forth by each agency participating in the Program.".

(c) PUBLIC INFORMATION.—Section 3 (15 U.S.C. 7502) is further amended by adding at the end the following:

"(d) PUBLIC INFORMATION.—

"(1) DATABASE.—

"(A) IN GENERAL.—The Director of the National Nanotechnology Coordination Office shall develop and maintain a searchable keyword database of all projects funded by the Nanoscale Science, Engineering, and Technology Subcommittee of the National Science and Technology Council.

''(B) DATABASE CONTENTS.—The database required by subparagraph (A) shall include the following, with respect to each project in the database:

''(i) A description of the project.

''(ii) The source of funding of the project, set forth by agency.

''(iii) The funding history of the project.

''(C) GROUPING OF PROJECTS IN THE ENVIRONMENTAL, HEALTH, AND SAFETY PROGRAM COMPONENT AREA.—For projects in the Environmental, Health, and Safety program component area, or any successor program component area, projects shall be grouped in the database by major objective as specified in the research plan required by section 10(b)(1).

''(D) GROUPING OF PROJECTS IN THE EDUCATION AND SOCIETAL DIMENSIONS PROGRAM COMPONENT AREA.—For projects in the Education and Societal Dimensions program component area, or any successor program component area, the projects shall be grouped in the database in the following categories:

''(i) Education in formal settings.

''(ii) Education in informal settings.

''(iii) Public outreach.

''(iv) Ethical, legal, and other societal issues.

''(E) ACCESSIBILITY.—The Director shall make the database required by subparagraph (A) accessible to the public.

''(2) INFORMATION ON NANOTECHNOLOGY FACILITIES.—

''(A) IN GENERAL.—The Director of the National Nanotechnology Coordination Office—

''(i) shall develop, maintain, and publicize information on nanotechnology facilities supported under the Program that are accessible for use by individuals from academic institutions and industry; and

''(ii) may include information on nanotechnology facilities that are—

''(I) supported by the States; and

''(II) accessible for use by individuals from academic institutions and from industry.

''(B) INFORMATION TO BE PUBLICIZED.—The information developed, maintained, and

publicized under subparagraph (A) shall include the following:

''(i) The terms and conditions for the use of each nanotechnology facility supported under the Program.

''(ii) A description of the capabilities of the instruments and equipment available for use at the facility.

''(iii) A description of the technical support available to assist users of the facility.''.

SEC. 4. ENHANCEMENT OF NATIONAL NANOTECHNOLOGY ADVISORY PANEL.

(a) ESTABLISHMENT OF SUBPANEL ON SOCIETAL, ETHICAL, LEGAL, ENVIRONMENTAL, AND WORKFORCE CONCERNS.—Section 4(a) of the Act (15 U.S.C. 7503(a)) is amended—

(1) by striking ''or designate'';

(2) by inserting ''as a distinct entity'' after ''Advisory Panel'';

(3) by inserting ''(1) ESTABLISHMENT OF ADVISORY PANEL.—'' before ''The President shall'' and indenting paragraph (1) as so designated 2 ems from the left margin; and

(4) by adding at the end the following:

''(2) ESTABLISHMENT OF SUBPANEL ON SOCIETAL, ETHICAL, LEGAL, ENVIRONMENTAL, AND WORKFORCE CONCERNS.—The Advisory Panel shall establish a subpanel with membership having specific qualifications tailored to enable it to carry out the requirements of subsection (c)(7).''.

(b) REPRESENTATION OF MINORITY-SERVING INSTITUTIONS.—Section 4(b) (15 U.S.C. 7503(b)) is amended—

(1) by designating the first, second, and third sentences as paragraphs (1), (2), and (3), respectively, and indenting such paragraphs, as so designated, 2 ems to the right;

(2) in paragraph (1), as so designated by paragraph (1) of this subsection—

(A) by striking ''or designated''; and

(B) by inserting ''MEMBERSHIP FROM ACADEMIC INSTITUTIONS AND INDUSTRY.—'' before ''The Advisory Panel'';

(3) in paragraph (2), as so designated by paragraph (1) of this subsection, by inserting ''QUALIFIED TO PROVIDE ADVICE.—'' before ''Members of'';

(4) in paragraph (3), as so designated by paragraph (1) of this subsection—

(A) by striking ''or designating''; and

(B) by inserting ''SEEKING RECOMMENDATIONS.—'' before ''In selecting''; and

(5) by adding at the end the following:

''(4) REPRESENTATION OF MINORITY-SERVING INSTITUTIONS.—At least one member of the Advisory Panel shall be an individual employed by and representing a minority-serving institution.''.

SEC. 5. TRIENNIAL EXTERNAL REVIEW OF NATIONAL NANOTECHNOLOGY PROGRAM.

Section 5 of the Act (15 U.S.C. 7504) is amended to read as follows:

''SEC. 5. EXTERNAL REVIEW OF THE NATIONAL NANOTECHNOLOGY PROGRAM.

''(a) IN GENERAL.—The Director of the National Nanotechnology Coordination Office shall, in consultation with the Nanoscale Science, Engineering, and Technology Subcommittee, the National Research Council of the National Academy of Sciences, and relevant Congressional staff, identify 3 highly targeted and timely topic areas that would benefit from review and evaluation. The Director will enter into an arrangement with the National Research Council to conduct these reviews.

''(b) MATTERS EVALUATED.—The reviews shall include an evaluation of topics relevant to the following:

''(1) The research priorities and technical content of the Program, including whether the allocation of funding among program component areas, as designated according to section 2(c)(2), is appropriate.

''(2) The effectiveness of the Program's management and coordination across agencies and disciplines, including an assessment of the effectiveness of the National Nanotechnology Coordination Office.

''(3) The scientific and technological accomplishments of the Program and the success of the Program in transferring technology to the private sector.

''(4) The adequacy of the activities of the Program in addressing ethical, legal, environmental, workplace, and other appropriate societal issues, including human health issues.

''(5) The adequacy and effectiveness of the Program's public education and outreach efforts.

''(6) The worldwide investment in and activities related to nanotechnology and an analysis of the relative position of the United States compared to other countries with respect to nanotechnology research and development.

''(7) The adequacy of the Program in incorporating the results of deliberative public input into the decisionmaking process.

''(c) EXTERNAL REVIEW REPORTS.—

''(1) IN GENERAL.—Not later than September 30, 2011, and every 3 years thereafter, the Director of the National Nanotechnology Coordination Office shall submit to the Advisory Panel, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science and Technology of the House of Representatives a report prepared by the National Research Council on the most recent external reviews carried out under subsection (a).

''(2) CONTENTS.—Each report required by paragraph (1) shall include the following:

''(A) The findings of the National Research Council with respect to the matters described in subsection (b).

''(B) The recommendations of the Director of the National Nanotechnology Coordination Office, if any—

''(i) on ways to improve the management and coordination processes of the Program; and

''(ii) for changes to the objectives, funding priorities, and technical content of the Program.

''(d) FUNDING.—There are authorized to be appropriated to the National Science Foundation for use by the National Nanotechnology Coordinating Office to carry out this section $500,000 for each of fiscal years 2010, 2011, and 2012.''.

SEC. 6. SOCIETAL DIMENSIONS OF NANOTECHNOLOGY.

(a) IN GENERAL.—The Act (15 U.S.C. 7501 et seq.) is amended—

(1) by redesignating section 10 as section 15;

(2) by inserting after section 9 the following:

''SEC. 10. SOCIETAL DIMENSIONS OF NANOTECHNOLOGY.

''(a) COORDINATOR FOR SOCIETAL DIMENSIONS OF NANOTECHNOLOGY.—

''(1) DESIGNATION.—The Director of the Office of Science and Technology Policy shall designate an associate director of the Office of Science and Technology Policy as the Coordinator for Societal Dimensions of Nanotechnology.

''(2) DUTIES.—The duties of the Coordinator for Societal Dimensions of Nanotechnology are as follows:

''(A) Providing oversight of the coordination, planning, and budget prioritization of activities required by section 2(b)(12).

''(B) With the assistance of appropriate senior officials of the agencies funding activities within the Environmental, Health, and Safety program component area and the Education and Societal Dimensions program component area, or any successor program component areas, ensuring that the requirements of section 2(b)(12) are satisfied.

''(C) Ensuring that the research plan required under subsection (b)(1) is—

''(i) developed, updated, and implemented as required thereunder; and

''(ii) responsive to the recommendations of the subpanel established under section 4(a)(2).

''(D) Encouraging and monitoring the efforts of the agencies participating in the Program to allocate the level of resources and management attention necessary to ensure that the ethical, legal, environmental, and other appropriate societal concerns related to nanotechnology, including human health and workplace

safety concerns, are addressed under the Program, including the implementation of the research plan required under subsection (b)(1).

''(E) Encouraging the agencies required to develop the research plan under subsection (b) to identify, assess, and implement suitable mechanisms for the establishment of public-private partnerships for support of environmental, health, and safety research.

''(b) RESEARCH PLAN.—

''(1) IN GENERAL.—

''(A) PANEL CONVENED AND PLAN REQUIRED.—Not later than 60 days after the date of enactment of the National Nanotechnology Initiative Amendments Act of 2009, the Coordinator for Societal Dimensions of Nanotechnology designated under subsection (a)(1) shall convene and chair a panel to develop, periodically update, and coordinate the implementation of a research plan for the Environmental, Health, and Safety program component area, or any successor program component area.

''(B) MEMBERSHIP.—The panel convened under subparagraph (A) shall be comprised of representatives from—

''(i) the agencies funding research activities under the program component area described in such subparagraph; and

''(ii) such other agencies as the Coordinator considers necessary.

''(C) SOLICITATION OF ADVICE.—In developing and updating the plan required by subparagraph (A), the panel convened under such subparagraph shall solicit and be responsive to recommendations and advice from—

''(i) the subpanel established under section 4(a)(2); and

''(ii) the agencies responsible for environmental, health, and safety regulations associated with the production, use, and disposal of nanoscale materials and products.

''(2) DEVELOPMENT OF STANDARDS.—The plan required by paragraph (1) shall include a description of how the Program will help to ensure the development of the following:

''(A) Standards related to nomenclature associated with engineered nanoscale materials.

''(B) Engineered nanoscale standard reference materials for environmental, health, and safety testing.

''(C) Instruments required to fill major gaps in metrology capabilities.

''(D) Standards related to methods and procedures for detecting, measuring, monitoring, sampling, and testing engineered nanoscale materials for environmental, health, and safety impacts.

''(3) COMPONENTS OF PLAN.—The plan required under paragraph (1) shall—

''(A) specify near-term research objectives and long-term research objectives;

''(B) specify milestones associated with each near-term objective and the estimated time and resources required to reach each milestone;

''(C) with respect to subparagraphs (A) and (B), describe the role of each agency carrying out or sponsoring research in order to meet the objectives specified under subparagraph (A) and to achieve the milestones specified under subparagraph (B);

''(D) specify the funding allocated to each major objective of the plan and the source of

funding by agency for the current fiscal year; and

''(E) estimate the funding required for each major objective of the plan and the source of funding by agency for the following 3 fiscal years.

''(4) INCORPORATION OF RECOMMENDATIONS OF ADVISORY PANEL.—The Coordinator designated under subsection (a)(1) and the panel convened under paragraph (1)(A) of this subsection shall incorporate any recommendations of the Advisory panel under subsection (g)(2) into the planning activity required under this subsection and provide the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives justification should the funding in the research plan not meet such recommendations.

''(5) SUBMITTAL OF INITIAL PLAN TO CONGRESS.—Not later than 180 days after the date of enactment of the National Nanotechnology Initiative Amendments Act of 2009, the Coordinator designated under subsection (a)(1) shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science

and Technology of the House of Representatives the initial plan required by paragraph (1).

''(6) ANNUAL UPDATE OF PLAN.—Each year, the panel convened under paragraph (1) shall update the plan required under such paragraph and submit the plan to the Council for inclusion in the annual report of the Council required by section 2(d).

''(c) REPORT REQUIREMENTS.—

''(1) IN GENERAL.—The Coordinator designated under subsection (a)(1) shall enter into an arrangement with the National Science Board of the National Academy of Sciences to create a report that identifies the broad goals and needs for environmental, health, and safety researchers.

''(2) MATTERS EVALUATED.—The report shall identify—

''(A) broad strategic goals of overall research;

''(B) critical needs of researchers; and

''(C) gaps in current research.

''(3) SUPPORT NOT SUPPLANT.—The report shall compliment and support the research plan required by subsection (b) but not supplant it.

''(4) SOLICITATION OF ADVICE.—In developing the report, the National Academy of Sciences shall solicit and be responsive to advice from—

''(A) the Advisory Panel under subsection (h)(2);

''(B) industry representatives; and

''(C) academia.

''(d) UNDERGRADUATE EDUCATION PROGRAMS.—

''(1) ACTIVITIES SUPPORTED.—As part of the activities included under the Education and Societal Dimensions program component area, or any successor program component area, the Program shall support efforts to introduce nanoscale science, engineering, and technology into undergraduate science and engineering education through a variety of interdisciplinary approaches. Activities supported may include the following:

''(A) The development of courses of instruction or modules to existing courses.

''(B) Faculty professional development.

''(C) The acquisition of equipment and instrumentation suitable for undergraduate education and research in nanotechnology.

''(2) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Di-

rector of the National Science Foundation to carry out activities described in paragraph (1), amounts as follows:

"(A) COURSE, CURRICULUM, AND LABORATORY IMPROVEMENT PROGRAM.—Through the Course, Curriculum, and Laboratory Improvement program of the National Science Foundation—

"(i) from amounts authorized under section 7002(b)(2)(B) of the America COMPETES Act (Public Law 110–69), $5,000,000 for fiscal year 2009; and

"(ii) from amounts authorized under section 7002(c)(2)(B) of such Act, $5,000,000 for fiscal year 2010.

"(B) ADVANCED TECHNOLOGY EDUCATION.—Through the Advanced Technology Education program of the National Science Foundation—

"(i) from amounts authorized under section 7002(b)(2)(B) of the America COMPETES Act (Public Law 110–69), $5,000,000 for fiscal year 2009; and

''(ii) from amounts authorized under section 7002(c)(2)(B) of such Act, $5,000,000 for fiscal year 2010.

''(e) INTERAGENCY WORKING GROUP.—The Council shall establish an Education Working Group under the Nanoscale Science, Engineering, and Technology Subcommittee of the Council to coordinate, prioritize, and plan both formal and informal educational activities supported under the Program, including activities to help participants understand environmental, health, and safety implications of nanotechnology.

''(f) SOCIETAL DIMENSIONS IN NANOTECHNOLOGY EDUCATION ACTIVITIES.—Activities supported under the Education and Societal Dimensions program component area, or any successor program component area, that involve informal, precollege, or undergraduate nanotechnology education shall include education regarding the environmental, health and safety, and other societal aspects of nanotechnology.

''(g) REMOTE ACCESS TO NANOTECHNOLOGY FACILITIES.—

''(1) IN GENERAL.—Agencies supporting nanotechnology research facilities as part of the Program shall require the entities that operate such facilities to allow access via the Internet by secondary school

students and teachers to instruments and equipment within such facilities for educational purposes and to informal science educators for science enrichment opportunities and public education purposes.

''(2) SUPPORT.—The agencies described in paragraph (1) shall support the costs associated with the provision of such access to facilities described in such paragraph.

''(3) WAIVER.—The agencies described in paragraph (1) may waive the requirement of paragraph (1) in cases when—

''(A) use of particular facilities would be inappropriate for educational purposes; or

''(B) the costs for providing the access to facilities as described in paragraph (1) would be prohibitive.

''(4) ESTABLISHMENT AND PUBLICATION OF PROCEDURES, GUIDELINES, AND CONDITIONS FOR USE OF FACILITIES.—The agencies identified in paragraph (1) shall require the entities that operate nanotechnology research facilities that are supported by such agencies as part of the Program to establish and publish procedures, guidelines, and conditions for the submission and approval of applications for

the use of such facilities for the purpose identified in paragraph (1).

''(5) TECHNICAL SUPPORT.—The agencies identified in paragraph (1) shall authorize personnel who operate the facilities described in such paragraph to provide necessary technical support to students and teachers who use such facilities.

''(h) ADVISORY PANEL REVIEW OF ENVIRONMENTAL, HEALTH, AND SAFETY PROGRAM COMPONENT AREA.—

''(1) IN GENERAL.—The Advisory Panel shall periodically review the funding level of the Environmental, Health, and Safety program component area, or any successor program component area, relative to the overall budget of the Program to determine whether the amount dedicated to this area is sufficient to address the research funding needs as estimated in the research plan required by subsection (b).

''(2) RECOMMENDATIONS.—If the Advisory Panel determines under paragraph (1) that the amount described in such paragraph is insufficient or excessive, the Advisory Panel shall submit to the Coordinator for Societal Dimensions of Nanotechnology a recommendation for an appropriate level of

funding for the Environmental, Health, and Safety program component area, or any successor program component area.''; and

(3) in section 4(d), by adding at the end the following: ''Such report shall include the findings of the Advisory Panel with respect to the most recent review required by section 10(h)(1) and any recommendations of the Advisory Panel under section 10(h)(2).''.

(b) NANOTECHNOLOGY EDUCATION PARTNERSHIPS.—Section 9 of the National Science Foundation Authorization Act of 2002 (42 U.S.C. 1862n) is amended by adding at the end the following:

''(e) NANOTECHNOLOGY EDUCATION PARTNERSHIPS.—

''(1) ESTABLISHMENT.—

''(A) IN GENERAL.—As part of the program authorized by subsection (a), the Director shall provide 1 or more grants under such subsection to establish partnerships described in paragraph (2) of such subsection, except that each such partnership shall include 1 or more businesses engaged in the production of nanoscale materials, products, or devices.

''(B) DESIGNATION.—A partnership established in accordance with subparagraph (A) shall be designated as a 'Nanotechnology Education Partnership'.

''(2) PURPOSE.—The purpose of a Nanotechnology Education Partnership is to recruit and help prepare secondary school students to pursue postsecondary level courses of instruction in nanotechnology and assist secondary institution and informal learning centers with outreach programs directed at secondary students.

''(3) USE OF GRANT FUNDS.—Notwithstanding subsection (a)(3), each entity receiving a grant under this subsection shall use the grant for the purposes described in paragraph (2), including uses in support of the following:

''(A) Professional development activities in formal and informal settings to enable secondary school teachers to use curricular materials incorporating nanotechnology and to inform teachers about career possibilities for students in nanotechnology.

''(B) Enrichment programs for students, including access to nanotechnology facilities and equipment at partner institutions in formal and

informal settings, to increase their understanding of nanoscale science and technology and to inform them about career possibilities in nanotechnology as scientists, engineers, and technicians.

''(C) Identification of appropriate formal and informal nanotechnology educational materials and incorporation of nanotechnology into the curriculum for secondary school students at one or more organizations participating in a Nanotechnology Education Partnership.

''(4) SELECTION OF GRANT RECIPIENTS.—Grants under this subsection shall be awarded in accordance with subsection (b), except that paragraph (3)(B) of such subsection shall not apply to grants awarded under this subsection.

''(5) NANOTECHNOLOGY DEFINED.—In this subsection, the term 'nanotechnology' has the meaning given the term in section 15 of the Act.''.

SEC. 7. TRANSFER OF NANOTECHNOLOGY.

(a) IN GENERAL.—The Act (15 U.S.C. 7501 et seq.) is amended by inserting after section 10, as added by section 6(a)(2) of this Act, the following:

''SEC. 11. TECHNOLOGY TRANSFER.

''(a) PROTOTYPING.—

''(1) ACCESS TO FACILITIES.—In accordance with section 2(b)(9), the agencies supporting nanotechnology research facilities as part of the Program shall provide access to such facilities to representatives from industry and other stakeholders for the purpose of transferring research results or assisting in the development of prototypes of nanoscale products, devices, or processes (or products, devices, or processes enabled by nanotechnology) for determining proof of concept.

''(2) PUBLICATION OF AVAILABILITY.—The agencies described in paragraph (1) shall publicize the availability of the facilities described in such paragraph and encourage their use by companies as provided for in this section.

''(3) PROCEDURES.—The agencies described in paragraph (1)—

''(A) shall establish and publish procedures, guidelines, and conditions for the submission and approval of applications for use of nanotechnology facilities;

''(B) shall publish descriptions of the capabilities of facilities available for use under this subsection, including the availability of technical support; and

''(C) may waive recovery, require full recovery, or require partial recovery of the costs associated with use of the facilities for projects under this subsection.

''(4) SELECTION AND CRITERIA.—In cases when less than full cost recovery is required pursuant to paragraph (3)(C), projects provided access to nanotechnology facilities in accordance with this subsection shall be selected through a competitive, merit-based process, and the criteria for the selection of such projects shall include the following:

''(A) The readiness of the project for technology demonstration.

''(B) Evidence of a commitment by the applicant for further development of the project to full commercialization if the proof of concept is established by the prototype.

''(C) Evidence of the potential for further funding from private sector sources following the successful demonstration of proof of concept.

''(5) SPECIAL CONSIDERATION FOR PROJECTS RELEVANT TO IMPORTANT NATIONAL NEEDS.—In selecting projects under paragraph (4), the agencies described in paragraph (1) may give special consid-

eration to applications that are relevant to important national needs or requirements.

''(b) USE OF EXISTING TECHNOLOGY TRANSFER PROGRAMS.—Each agency participating in the Program shall—

''(1) if the agency administers a Small Business Innovation Research Program or a Small Business Technology Transfer Program, encourage the submission of applications for support of nanotechnology related projects to such programs; and

''(2) through the National Nanotechnology Coordination Office established under section 3(a) and not later than 180 days after the date of enactment of the National Nanotechnology Initiative Amendments Act of 2009, submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives—

''(A) the plan described in section 2(c)(7); and

''(B) a report specifying, if the agency administers a Small Business Innovation Research Program and a Small Business Technology Transfer Program—

"(i) the number of proposals received for nanotechnology related projects during the current fiscal year and the previous 2 fiscal years;

"(ii) the number of such proposals funded in each year;

"(iii) the total number of nanotechnology related projects funded and the amount of funding provided for fiscal year 2003 through fiscal year 2007; and

"(iv) a description of the projects identified in accordance with clause (iii) which received private sector funding beyond the period of phase II support of the Small Business Innovation Research Program and the Small Business Technology Transfer Program.

"(c) INDUSTRY LIAISON GROUPS.—An objective of the Program shall be to establish industry liaison groups for all industry sectors that would benefit from applications of nanotechnology. The Nanomanufacturing, Industry Liaison, and Innovation Working Group of the National Science and Technology Council shall actively pursue establishing such liaison groups.".

(b) TECHNOLOGY INNOVATION PROGRAM SUPPORT FOR NANOTECHNOLOGY.—Section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n) is amended—

(1) in subsection (d)—

(A) by striking ''The Director'' and inserting the following:

''(1) IN GENERAL.—The Director''; and

(B) by adding at the end the following:

''(2) SOLICITATION OF NANOTECHNOLOGY PROPOSALS.—The Director shall encourage the submission of proposals under paragraph (1) for support of nanotechnology related projects.'';

(2) in subsection (g)—

(A) by striking ''The Director'' and inserting the following:

''(1) IN GENERAL.—The Director''; and

(B) by adding at the end the following:

''(2) NANOTECHNOLOGY REPORT REQUIREMENTS.—The report required by paragraph (1) shall include a description of—

''(A) how the requirement of subsection (d)(2) is being met;

''(B) the number of proposals for nanotechnology related projects received;

''(C) the number of such proposals funded;

''(D) the total number of such projects funded since the beginning of the Technology Innovation Program; and

''(E) the outcomes of such funded projects in terms of the metrics described in paragraph (1).'';

(3) in subsection (k)(3)—

(A) in subparagraph (C), by striking ''and''; and

(B) by adding at the end the following:

''(E) advice on how to accomplish the requirement of subsection (d)(2); and

''(F) an assessment of the adequacy of the allocation of resources for nanotechnology related projects supported under the Technology Innovation Program.''; and

(4) in subsection (l)—

(A) in paragraph (4)(B), by striking the ''and'' at the end;

(B) in paragraph (5), by striking the period at the end and inserting ''; and''; and

(C) by adding at the end the following:

''(6) the term 'nanotechnology' has the meaning given the term in section 15 of the 21st Century

Nanotechnology Research and Development Act (15 U.S.C. 7501(a)).''.

(c) COORDINATION WITH STATE INITIATIVES.—Section 2(b)(7) of the Act, as redesignated by section 2(b)(1)(A) of this Act, is amended to read as follows:

''(7) ensuring United States global leadership in the development and application of nanotechnology, including through coordination and leveraging Federal investments with nanotechnology research, development, and technology transition initiatives supported by the States;''.

SEC. 8. RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

The Act (15 U.S.C. 7501 et seq.) is amended by inserting after section 11, as added by section 7(a) of this Act, the following:

''SEC. 12. RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

''(a) IN GENERAL.—The Program shall include support for nanotechnology research and development activities directed toward application areas that have the potential for significant contributions to national economic competitiveness and for other significant societal benefits. The activities supported shall be designed to advance the development of research discoveries by demonstrating solutions to important problems in areas such as the following:

''(1) Nano-electronics.

''(2) Energy production, transmission, storage, use, and efficiency, including renewable energy.

''(3) Health care.

''(4) Water remediation and purification.

''(5) Instrumentation for nanoscale characterization and metrology.

''(6) Rapid production nanomanufacturing for information and intelligence, including cost-effective, green, and safe nanomaterial manufacturing methods.

''(7) Precision agriculture.

''(8) Sensors and sensor networks for defense and homeland security.

''(b) ADDITIONAL RESEARCH.—In addition, the program will support research that addresses the following:

''(1) The environment, health, and safety risks of nanoparticles.

''(2) Ethical, legal, and societal issues relating to nanotechnology.

''(c) RECOMMENDATIONS.—The Advisory Panel shall make recommendations to the Program for candidate research and development areas for support under this section.

''(d) CHARACTERISTICS.—

''(1) IN GENERAL.—Research and development activities under this section shall—

''(A) include projects selected on the basis of applications for support through a competitive, merit-based process;

''(B) involve collaborations among researchers in academic institutions and industry, and may involve nonprofit research or educational institutions and Federal and National laboratories, as appropriate;

''(C) when possible, leverage Federal investments through collaboration with related State initiatives; and

''(D) include a plan for fostering the transfer of research discoveries and the results of technology demonstration activities to industry for commercial development.

''(2) PROCEDURES.—

''(A) IN GENERAL.—Determination of the requirements for applications under this subsection, review and selection of applications for support, and subsequent funding of projects shall be carried out by a collaboration of no fewer than 2 agencies participating in the Program.

''(B) SPECIAL CONSIDERATION.—In selecting applications for support, the agencies shall give special consideration to projects that include cost sharing from non-Federal sources.

''(3) INTERDISCIPLINARY RESEARCH CENTERS.—Research and development activities under this section may be supported through interdisciplinary nanotechnology research centers, as authorized by section 2(b)(6), that are organized to investigate basic research questions and carry out technology demonstration activities in areas such as those identified under subsection (b).''.

SEC. 9. NANOMANUFACTURING RESEARCH.

(a) IN GENERAL.—The Act (15 U.S.C. 7501 et seq.) is amended by inserting after section 12, as added by section 8 of this Act, the following:

''SEC. 13. NANOMANUFACTURING RESEARCH.

''(a) RESEARCH AREAS.—The Nanomanufacturing component area of the Program, or any successor component area, shall include research on the following:

''(1) Development of instrumentation and tools required for the rapid characterization of nanoscale materials and for monitoring of nanoscale manufacturing processes.

''(2) Approaches and techniques for scaling the synthesis of new nanoscale materials to achieve industrial-level production rates.

''(3) Improvements in atomically precise measurement, monitoring, manipulating, and manufacturing.

''(4) Development of nanotechnology production methods and tools for aerospace information and intelligence applications.

''(b) GREEN NANOTECHNOLOGY.—Interdisciplinary research centers supported under the Program in accordance with section 2(b)(6) that are focused on nanomanufacturing research and centers established under the authority of section 12(c)(3) shall include, as part of the activities of such centers, the following:

''(1) Research on methods and approaches to develop environmentally benign nanoscale products and nanoscale manufacturing processes, taking into consideration relevant findings and results of research supported under the Environmental, Health, and Safety program component area, particularly as to full life-cycle assessments, or any successor program component area.

''(2) Fostering the transfer of the results of such research to industry, including through indus-

try-led collaborative translational research, with priority consideration given to proposals that provide non-Federal funds in an amount not less than 25 percent of the total amount of any funding to be awarded under the Program.

''(3) Providing for the education of scientists and engineers through interdisciplinary studies in the principles and techniques for the design and development of environmentally benign nanoscale products and processes and in the full life-cycle assessment of the nanomaterials and nanotechnologies involved.''.

(b) REVIEW OF NANOMANUFACTURING RESEARCH AND RESEARCH FACILITIES.—

(1) DEFINITIONS.—In this subsection, the terms ''nanotechnology'', ''nanoscale'', ''program component area'', ''Program'', and ''Advisory Panel'' have the meaning given such terms in section 15 of the Act, as redesignated by section 6(a)(1) and amended by section 13 of this Act.

(2) PUBLIC MEETING.—

(A) IN GENERAL.—Not later than 6 months after the date of enactment of this Act, the Director of the National Nanotechnology Coordination Office established under section

3(a) of such Act (15 U.S.C. 7502(a)) shall sponsor a public meeting, including representation from a wide range of industries engaged in nanoscale manufacturing—

(i) to obtain the views of participants at the meeting on—

(I) the relevance and value of the research being carried out under the Nanomanufacturing program component area, or any successor program component area to industry, labor, and the larger public interest; and

(II) whether the capabilities of nanotechnology research facilities supported under the Program are adequate—

(aa) to meet current and near-term requirements for the fabrication and characterization of nanoscale devices and systems; and

(bb) to provide access to and use of instrumentation and equipment at the facilities, by means of networking technology,

to individuals who are at locations remote from the facilities; and

(ii) to receive any recommendations on ways to strengthen the research portfolio supported under the Nanomanufacturing program component area, or any successor program component area, and on improving the capabilities of nanotechnology research facilities supported under the Program.

(B) INVITATIONS TO PUBLIC MEETING.—The Director of the National Nanotechnology Coordination Office shall invite companies and labor organizations that are participating in industry liaison groups to participate in the meeting required by subparagraph (A).

(C) REPORT ON PUBLIC MEETING.—Not later than 1 year after the meeting sponsored by the Office, the Director shall prepare and submit to the Advisory Panel a report documenting the findings and recommendations of the Director with respect to the meeting required by subparagraph (A).

(3) ADVISORY PANEL REVIEW.—

(A) IN GENERAL.—The Advisory Panel shall review the Nanomanufacturing program component area, or any successor program component area, and the capabilities of nanotechnology research facilities supported under the Program to assess the following:

(i) Whether the funding for the Nanomanufacturing program component area, or any successor program component area, is adequate and receiving appropriate priority within the overall resources available for the Program.

(ii) The relevance of the research being supported to the identified needs and requirements of industry, labor, and long-term public interest.

(iii) Whether the capabilities of nanotechnology research facilities supported under the Program are adequate—

(I) to meet current and near-term requirements for the fabrication and characterization of nanoscale devices and systems; and

(II) to provide access to and use of instrumentation and equipment at

the facilities, by means of networking technology, to individuals who are at locations remote from the facilities.

(iv) The level of funding that would be needed to support—

(I) the acquisition of instrumentation, equipment, and networking technology sufficient to provide the capabilities at nanotechnology research facilities described in subparagraph (C); and

(II) the operation and maintenance of such facilities.

(B) INCORPORATION OF FINDINGS FROM PUBLIC MEETING.—In carrying out the review required by subparagraph (A), the Advisory Panel shall take into consideration the findings and recommendations in the report submitted by the Director of the National Nanotechnology Coordination Office under paragraph (2)(C).

(C) REPORT ON ADVISORY PANEL REVIEW.—Not later than 24 months after the date of enactment of this Act, the Advisory Panel shall submit to the Committee on Commerce, Science, and Transportation of the Sen-

ate and the Committee on Science and Technology of the House of Representatives a report on the review required by subparagraph (A), including the following:

(i) The recommendations, if any, of the Advisory Panel with respect to the Nanomanufacturing program component area.

(ii) The report required by paragraph (2)(C).

SEC. 10. NANOSCALE CHARACTERIZATION AND METROLOGY.

The Act (15 U.S.C. 7501 et seq.) is amended by inserting after section 13, as added by section 9(a) of this Act, the following:

"SEC. 14. NANOSCALE CHARACTERIZATION AND METROLOGY.

''(a) RESEARCH AREAS.—The Instrument Research, Metrology, and Standards program component area, or any successor program component area, shall include research on translational development of instrumentation, tools, approaches, and techniques required for the characterization of nanoscale materials and for nanoscale metrology, including improvements in speed, accuracy, and scalability.

''(b) ENVIRONMENTAL, HEALTH, AND SAFETY EFFECTS.—Interdisciplinary research centers supported under the Program in accordance with section 2(b)(6) that are focused on nanoscale characterization and metrology in accordance with section 12(c)(3) shall include as part of the activities of such centers—

''(1) research on methods and approaches to develop characterization and metrology capabilities relevant to the Environmental, Health, and Safety program component area, or any successor program component area; and

''(2) fostering the transfer of the results of such research to industry, including through industry-led collaborative translational research.''.

SEC. 11. DELIBERATIVE PUBLIC INPUT IN DECISION-MAKING PROCESSES.

(a) BEGINNING A NATIONAL DISCUSSION.—Not later than 6 months after the date of enactment of this Act, the Director of the National Nanotechnology Coordination Office, established under section 3(a) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7502(a)), shall convene the first in a series of national discussions to engage the people of the United States, increase their awareness of nanotechnology, and

give them a continuing voice in the evolution of nanotechnology.

(b) FORM.—The Director shall convene the national discussions required by subsection (a) through not fewer than 2 deliberative forums in the first 18 months, including one large-scale forum and one small-scale forum, and, in each subsequent year, at least one deliberative forum that includes each of the stakeholder groups described in subsection (d).

(c) PARTICIPATION.—The Director shall ensure that the population of participants in the forums is diverse in—

(1) age;

(2) geography;

(3) income;

(4) ethnicity; and

(5) education.

(d) BROAD PARTICIPATION AND INCORPORATION OF STAKEHOLDER VIEWS.—The Director shall incorporate the views, positions, and the participation of key stakeholder groups in the forums, including representatives of—

(1) academia;

(2) industry;

(3) labor;

(4) environmental organizations;

(5) consumer advocacy organizations;

(6) other public-interest, non-governmental organizations; and

(7) citizens from the general public.

(e) IDENTIFICATION OF PRIORITIES AND CONCERNS.—The Director shall identify the collective priorities and concerns of the general public and other stakeholder groups that relate to—

(1) nanotechnology products;

(2) research and development;

(3) regulatory policy;

(4) other concerns as identified by the group; and

(5) the means by which citizens can learn about and participate in policies affecting the design and use of nanotechnology on an ongoing basis.

(f) REPORT.—Not later than 1 year after the completion of each of the forums, the Director shall submit a report to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives summarizing the results of the forums and a report issued and approved by the participants of the small-scale forum.

(g) AUTHORIZATION OF APPROPRIATIONS.—

(1) IN GENERAL.—There are authorized to be appropriated to the Director of National Nanotechnology Coordination Office $2,000,000 to carry out this section.

(2) SUPPLEMENT NOT SUPPLANT.—The amount authorized to be appropriated by paragraph (1) for the purpose described in that paragraph is in addition to amounts provided in support of the operation of the National Nanotechnology Coordination Office under section 3(b) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7502(b)), as amended by section 2(b)(1) of this Act.

SEC. 12. AMENDMENTS TO DEFINITIONS.

Section 15 of the Act, as redesignated by section 6(a)(1) of this Act, is amended—

(1) in paragraph (2)—

(A) by striking ''atomic, molecular, and supramolecular levels'' and inserting ''nanoscale''; and

(B) by striking ''molecular organization, properties, and'' and inserting ''properties or''; and

(2) by adding at the end the following:

''(7) NANOSCALE.—The term 'nanoscale' means one or more dimensions of between approximately 1 and 100 nanometers.

''(8) FORMAL LEARNING.—The term 'formal learning' means learning that takes place in a classroom setting with traditional academic activities and learning outcomes and emphasizes conceptual knowledge.

''(9) INFORMAL LEARNING.—The term 'informal learning' means learning that can take place in museums, nature centers, and through everyday activities like gardening, hiking, and participation in clubs. Informal learning is self-motivated, guided by learner interests, voluntary, personal, ongoing, contextually relevant, collaborative, non-linear, and open-ended.

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