



General Programmatic Terms and Conditions (PTCs) for the Materials Innovation Platforms (NSF 15-522) Cooperative Agreement(s)

NSF 15-522: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf15522

1. **Key Personnel:**

Except for the Principal Investigator(s) (PIs) or Co-PIs identified in this award, requests to make any changes to personnel, organizations, and/or partnerships specifically named in the proposal, that have been approved as part of this award, shall be submitted in writing to the cognizant NSF Program Official for approval prior to any changes taking effect. Requests for prior approval of changes to the PI(s) must be submitted through Research.gov for review by the cognizant Program Official and approval by an NSF Grants Official.

2. **Program/Project Description:**

Materials Innovation Platforms (MIP) respond to the increasing complexity of conducting materials research that requires the close collaboration of multidisciplinary teams who have access to cutting edge tools. MIPs push the frontiers in materials research by advancing the capabilities of current state-of-the-art experimental tools through the development of new techniques and the next generation of instrumentation that will lead to understanding and discovering new phenomena as well as the discovery of complex functional material systems. MIPs seek to impact an area of national importance through targeted and focused materials research where both a local in-house research team and external users are provided access to mid-scale level equipment. The in-house research is conducted by a team of researchers comprised of experts in synthesis, characterization, and theory/modeling who work in a tightknit, closed-loop iterative collaboration in an effort to accelerate materials discovery. In addition, it is expected that open access to these cutting edge tools nationwide will strengthen collaborations among scientists and enable researchers to work in new ways, while fostering new modalities of multidisciplinary education and training. Working in tandem on the MIP-defined focused research area, the in-house researchers and external users will accelerate materials discovery, development, and deployment.

3. **Project Governance:**

The Awardee, in coordination with sub-awardees, assume overall responsibility for the planning, operation, safety, and scientific and technical management of the MIP. The overall mission of the MIP is to provide access to thin film and bulk crystal facilities, instrumentation, expertise in synthesis, processing, characterization, theory/modeling, new materials and data/codes generated by the MIP, and the necessary services for research

conducted by users from institutions across the nation to design and create new materials with unprecedented properties for the next generation of electronics. The in-house research team is comprised of experts in synthesis, characterization, and theory/modeling who work in a tightknit, closed-loop iterative collaboration in an effort to accelerate materials discovery. External users will also conduct research leading to new materials discovery, development, and deployment. These external users will be able to utilize not only the instrumentation within the facility, but also the MIP supplied expertise in synthesis, processing, characterization, theory/modeling, and data processing.

Access to the resources of the MIP Facility is based on review of competitive proposals, where at least 50% of the user time is dedicated for external users. The external user proposal shall be evaluated on the basis of the scientific and technical merit, the degree of alignment with discovery of new electronic materials, and on the broader implications of the work as defined in the NSF Merit Review Criteria. Rare exceptions to the proposal review requirement may exist in the form of: time for hands-on training workshops; time for proprietary research (paying full cost recovery); time for feasibility or development studies; and, other special cases at the MIP Director's discretion. The Awardee will ensure that an efficient and effective project governing structure is in place throughout the award period to support all critical or significant project activities. Components of the governing structure should include, but not limited to:

Director/PI

Co-PIs

External Advisory Committee (EAC)

MIP Users Committee

MIP User Proposal Review Committees (UPRC)

MIP Diversity Committee (DC)

4. Governing Responsibilities:

The Awardee will ensure that efficient and effective performance of all project responsibilities by the governing components throughout the award period. Components of the management, management structure, and the responsibilities are as follows:

- a. The Awardee shall be responsible for the management, operation, safety, cyber security, and maintenance of the MIP. The President of the awardee institution shall appoint the MIP External Advisory Committee (EAC) from the scientific and engineering community in consultation with the NSF.
- b. Principal Investigator (PI) is the PI and serves as the Director of the MIP. The Director, in consultation with NSF staff, shall appoint the Associate Director who assists the Director as well as runs the MIP User Program and the Director of In-House Research who manages the internal research program. The PI:
 - i. Manages and oversees strategic planning, operational, and R&D functions for the MIP.
 - ii. Formulates and manages annual and long-term plans and budgets for the MIP.
 - iii. Defines and articulates the strategic direction of the MIP including future upgrades.

- iv. Is responsible for the proposal review process and final decisions on the MIP user allocations.
 - v. Reports to the Vice President/Provost for Research.
- c. The Co-PIs: The co-PIs have the authority to recommend new directions for the MIP within their scientific subfields, in close consultation with the appropriate Advisory Committee.
- d. An External Advisory Committee (EAC): EAC shall meet at least annually in order to assess the overall performance, safety, policies, objectives and mission of the MIP and to recommend changes and review new directions as appropriate. Personnel from the MIP institutions are excluded from serving on the EAC. The EAC will report to the Vice President/Provost for Research at the awardee institution. The PI/Director shall submit EAC reports, and any responses, to the cognizant NSF Program Official following each EAC meeting.
- e. The MIP Users Committee: Members of the Users Committee will be external users of the MIP facilities and knowledgeable in their development and operation. These members will not come from the MIP institution(s). The User Committee shall meet at least annually to provide advice to the MIP Director on policies relating to the use and development of the MIP facilities, safety concerns, access to MIP products, and the curation and full use of data-related products of the MIP. MIP products include, but are not limited to, samples, code, and data. The User Committee shall prepare at least one written report to the MIP Director annually, which should be included in the annual report to NSF.
- f. MIP User Proposal Review Committee (UPRC): The MIP will form a User Proposal Review Committee that is responsible for the selection and recommendation of user proposals to the User Facility Director that align with the scientific goals of the MIP. Reviewers are chosen for their scientific and/or technical expertise from the scientific and technical community at large. Reviewers evaluate proposals on the basis of scientific and technical merit, alignment to goal of new electronic materials discovery, and on the broader implications of the work as defined in the NSF Merit Review Criteria. NSF expects the MIP to use reviewers from MIP-institutions only in cases where their expertise is critical to a decision on a proposal, such as feasibility of the proposed project. The MIP will make every attempt to avoid real and perceived conflicts of interest when assigning reviewers, and reviewers shall identify any potential conflicts of interest for each review. The proposal review process will be transparent and made publically available on the MIP and MIP-related websites.
- g. The Diversity Committee (DC): The MIP Director shall appoint the members of the DC. The DC is responsible for developing, and aiding the Director in implementing, a strategic plan that ensures diversity in the facility's leadership, governing committees, staff, undergraduate, graduate students, postdoctoral associates, and users. The committee shall also be responsible for evaluating the effectiveness of the previous year's plan, identifying opportunities, and developing plans for

improvements. The Diversity Committee should prepare a report to the MIP Director to be included in the NSF annual report.

- h. Users of the MIP: Users of the MIP come from US academic institutions, National Laboratories, other federal, state and governmental agencies, industry, non-profits, foundations, and international institutions. Time is allocated for users of the MIP as the following:
 - i. At least 50% of the MIP time allocations will go to users not affiliated with the MIP institution(s), unless stipulated otherwise by NSF.
 - ii. No more than 50% of the MIP time allocations will go to the in-house research program.
 - iii. At least 10% of the overall MIP time allocations will go to users who are not from tier 1 research universities, i.e., from 4-year institutions, non-tier 1 universities, and minority serving institutions.
 - iv. No more than 10% of the overall MIP time allocations will go to synergistic topics.

The Awardee shall be responsible for enhancing, supporting and developing an in-house research program; a vibrant external user program; an overall community of practitioners advancing the discovery of new materials for electronic devices; collaboration with industry, non-profits, and government laboratories and international collaborators; and educational and public outreach programs of an appropriate size and scale that align with the stated objectives of the platform. The Awardee shall assist and encourage the involvement of undergraduate and graduate students, postdoctoral investigators and research associates from various types of institutions in research and educational programs conducted at the MIP. The management of the MIP shall foster the involvement of women, minorities, and people with disabilities in the full spectrum of MIP activities. The MIP shall maintain a uniform database of quantitative indicators of activities and progress. NSF will provide a list of the indicators in run-cycle and annual report guidelines.

5. Reporting and Review Requirements:

- a. Annual Progress Report: The Awardee will submit an Annual Progress Report via Research.gov at least 90 days before the end of the current period of performance of each year. NSF will supply annual reporting guidelines to the PI by e-mail. The annual report will include, but is not limited to the following:
 - i. Vision statement for the MIP which includes the national need for the research topic and the approach taken to accelerate electronic materials discovery, development, and deployment through the in-house research program and the work of the external users.
 - ii. An updated long-range plan including projected activities, budget expectations, and priorities to the end of the award period.
 - iii. A progress report describing scientific and technical accomplishments of the in-house research program specifically towards the discovery of new materials; scientific and technical accomplishments of the users; detailed user statistics including the use of samples and data from the MIP; facility

developments and upgrades; safety updates; instrumentation acquisition and technique development; collaborations with industry; international cooperation; advances towards creating a community of practitioners advancing the discovery of new electronic materials; education and outreach achievements; publications, patents and other innovations resulting from the MIP activities.

- iv. An update on progress in the management of Samples, Codes, and Data.
 - v. An update on progress in the Diversity Strategic Plan.
 - vi. Statistical and budgetary information.
 - vii. Highlights of research, education, and infrastructure development.
 - viii. A copy of the MIP public Annual Report (see below).
 1. The cognizant NSF Program Official is responsible for approval of the annual report and will notify the Awardee in writing when approved. The release of the next increment of funding is contingent upon the NSF Program Official's approval of the annual report.
 2. In addition, the Awardee will prepare a MIP Annual Report for public dissemination. This annual report will include, but is not limited to, a Director's overview of the past year, lists of all proposals awarded experiment time by instruments, and resulting publications as a function the MIP user facility site.
- b. **Strategic and Implementation Plan:** The Awardee shall submit a Strategic and Implementation Plan within 9 months of the award to include an overview of the vision and need for the MIP, management structure and governance, the Facility, In-house research program strategic and implementation plan, User Program strategic and implementation plan, and cross-cutting activities that lead to a community of practitioners discovering and developing new electronic materials. This plan should be reviewed yearly with input from the various constituents, including the External Advisory Committee, and updated as necessary.
- c. **Safety Operation and Access Action Plan:** The Awardee shall submit a Safety and Access Action Plan within 9 months of the award that outlines a plan for safe access and operation of the MIP equipment, tools, and processes for in-house researchers, students, post-docs and external users of the facilities. This plan will be updated periodically and reported on each year in the Annual Report.
- d. **Samples, Codes and Data Management Plan:** The Awardee shall submit a Samples, Codes and Data Management Plan within 9 months of the award that includes a plan for sample management and sharing, data management and curation, as well as code and algorithm management. Community access to these products and how the community benefits from their presence should clear. The Plan should be updated yearly with input from the various constituents, including the External Advisory Committee.
- e. **Diversity Strategic Plan:** The Awardee shall submit a Diversity Strategic Plan within 9 months of the award. This Plan should address how the MIP will ensure meaningful

and substantive inclusion of women, minorities underrepresented in science technology engineering and mathematics (STEM), and persons with disabilities who will contribute to research enterprise of the MIP. The MIP must strive for inclusion at all levels of the organization. This plan should be updated yearly with input from the various constituents, including the Diversity Committee.

- f. Run Cycle Report: The awardee will report performance metrics to NSF following the completion of every run cycle, as defined by the MIP. Required metrics include:
 - i. Materials, systems, and/or classes developed by users and the MIP user facility site.
 - ii. Indication of demand for the MIP user facility site(s), instruments, samples, codes, and data.
 - iii. User program demographics (geographical, gender, racial, ethnic, industrial, government lab, international, non-profits, new PI, new user).
 - iv. User PI collaboration with the MIP staff, the MIP in-house research team, or the MIP-affiliated faculty.
- g. Special Reports: The Awardee shall submit such Special Reports as may be reasonably required by the Foundation.
- h. On-site Reviews: On-site reviews by NSF Program Officials, with or without a panel of experts, shall be held periodically. The reviews will be carried out according to schedule, content, and participation determined by the cognizant NSF Program Official and the MIP Director.
 - i. Site visits are limited to the facilities and records associated with the MIP award.
 - ii. An on-site Management Review will be convened by NSF in the first year of the award.
 - iii. A technical review with a panel of experts will take place the 2nd year of the award followed with a renewal site visit in the 4th year.
 - iv. NSF reserves the right to conduct additional site visits in the 3rd and 5th years, depending on the findings of site visits in Years 2 and 4.
- i. Business Systems Review: A Business Systems Review (BSR) and/or other similar reviews may be conducted as deemed necessary by NSF.
- j. Final Report: The Awardee will submit a Final Report via Research.gov within 90 days following the expiration of the award. The Final report guidelines will be supplied by NSF, patterned on the annual report guidelines, and will request cumulative narratives, data, and budgetary information.

6. Awardee Support of Ongoing Management and Oversight:

The Awardee will ensure full commitment and cooperation among the governing structure components, and all project staff during all ongoing NSF project management and oversight activities. The Awardee will strive to ensure availability of all key institutional

partners during any site review as well as providing timely access to all project documentation.

The cognizant Program Official will monitor the degree to which the MIP meets NSF's expectations through annual management and technical site visits, interim reports (i.e. monthly highlights, MIP news, and run cycles), annual reports, and final reports on a regular schedule.

- a. NSF will conduct periodic comprehensive site visits. The cognizant Program Official will appoint Members of the Review Committee. The date and time of the site visit will be negotiated between the MIP Director and the NSF Program Official.
- b. The MIP management must seek to embrace the cultural, gender, racial, and ethnic diversity of the U.S. in the composition of their participants at all levels. The following are expected responses from the awardees:
 - i. Prepare and execute a diversity strategic plan with goals and intended actions to increase the diversity of the platform's leadership, staff, undergraduate students, graduate students, and postdoctoral associates.
 - ii. Assure diverse representation in all MIP sponsored outreach activities, such as the Research Experiences for Undergraduate (REU) program, summer schools, and workshops.
- c. NSF will specify the format of the progress report/renewal proposal, the review process, and review criteria approximately six months before the date agreed upon for submission.
- d. Termination of the Cooperative Agreement (CA). NSF's agreement with the Platform may be terminated as a result of a site visit review indicating insufficient progress in organizing the MIP to achieve its vision, or not addressing one or more key aspects of the Platform. The awardee will have 90 days to appeal and address the identified issues once notified by NSF of the intent to terminate the CA. In the case of termination, NSF support to the Platform will be phased down over one to two years.
- e. If this award is renewed, NSF may carry out a summative site visit at the end of the 10th year of support to determine the long-term value added by the MIP.