

National Science Foundation
Directorate for Mathematical and Physical Sciences
Charge to: MPSAC Subcommittee for Studying the Role of NSF/DMR in Synchrotron Science

Background

The Division of Materials Research, DMR, supports activities in experimental, computational and theoretical materials research. In addition it supports national user facilities through its stewardship of the National High Magnetic Field Laboratory (NHMFL) and the Cornell High Energy Synchrotron Source (CHESS); and its partnerships in the National Nanotechnology Innovation Network (NNIN) and the Center for High Resolution Neutron Science (CHRNS). Funding for general instrumentation acquisition as well as research and development of new experimental tools has been limited in recent years. The DMR instrumentation programs (Instrumentation for Materials Research (IMR) and Instrumentation for Materials Research Major Instrumentation Program (IMR-MIP)) have not been active. Although many proposals are awarded through the NSF-wide Major Research Instrumentation (MRI) competition, there is an ever-increasing demand for upgrading existing capabilities, acquiring new capabilities, and research and development of next-generation experimental tools. In particular across all areas of materials research there is a need for the development of new experimental tools that will provide three-dimensional, real time characterization of materials and systems in realistic environments.

In the preceding five years DMR has received recommendations from two subcommittees of the Mathematical and Physical Sciences Advisory Committee (MPSAC) regarding its investment in research infrastructure. The first addressed synchrotron science (Light Source Panel Report, 2008¹) and the other took a more broad view of research infrastructure for materials research (Materials 2022 Report, 2012²). Significant changes have occurred since the Light Source Panel report was accepted. National needs for additional capacity have evolved, other capabilities have emerged, and the projected doubling of the NSF budget has not occurred. These changes are significant, especially when coupled with the growing need to revitalize and reinvigorate the research infrastructure for materials science nationally. Consequently, the MPSAC is being asked to form a subcommittee to provide a vision for the NSF in the broad area of synchrotron science, with emphasis on the science enabled by instrumentation at and access to synchrotron capabilities.

Charge to the subcommittee

The subcommittee is asked to provide a vision for the role NSF and the Division of Materials Research should have in synchrotron science emphasizing the potential for opening new avenues of research and discoveries in materials science and engineering. In developing this vision, the committee should be cognizant of the capabilities at and usage of existing federally and State supported synchrotron user facilities, the MPSAC Light Source Report (2008),¹ recent advances in compact light sources,³ and the recommendation from the MPSAC Materials 2022 Report

¹ <http://www.nsf.gov/attachments/109807/public/LightSourcePanelFinalReport9-15-08.pdf>

² http://www.nsf.gov/attachments/124926/public/DMR_Materials_2022_Report.pdf

³ <http://science.energy.gov/~media/bes/pdf/reports/files/CLS.pdf>

(2012)² that “NSF should value uniqueness and novelty over capacity building in large facilities as criteria for support.” The Panel should consider the capabilities, capacity, and potential for advancing science enabled by synchrotron capabilities, as well as the development of new experimental tools and the education mission of ensuring that the national need for synchrotron scientists is met. These considerations should be balanced against projected and realistic NSF budget scenarios as well as the broader need for investment in and development of research infrastructure in support of materials science as recommended in the Materials 2022 Report (2012).

Timeline

Charge to Committee – Feb 2013

Interim reports to MPSAC will be due quarterly. These will report on the progress being made and bring to the attention of the MPSAC any major issues. The reports can be delivered via Web-Ex or a similar meeting tool. These will be coordinated by MPSAC.

A final report will be due Feb. 2014 with a presentation to the MPSAC at its Spring 2014 meeting. This presentation may be delivered remotely or in person.

Resources

The NSF will cover the costs associated with one face-to-face meeting, which will be held at NSF. NSF will arrange for and host Web-Ex meetings as needed by the subcommittee.

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