

FY 2023 Report of Committee of Visitors

BES Materials Sciences and Engineering Division (MSE) Review of FY 2018, 2019, 2020, 2021, 2022

Presented to the Basic Energy Sciences Advisory Committee

Frances Hellman, COV Chair

December 12, 2024



U.S. DEPARTMENT OF
ENERGY

Office of
Science

[Energy.gov/science](https://www.energy.gov/science)

Committee of Visitor Charge

1. For both the DOE Laboratory projects and the University projects, assess the efficacy and quality of the processes used to:
 - a. solicit, review, recommend, and document proposal actions and
 - b. monitor active projects and programs.
 2. Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected:
 - a. the breadth and depth of portfolio elements, and
 - b. the national and international standing of the portfolio elements.
- The Office of Science additionally requested that COV comment on the diversity, equity, and inclusivity of participation in MSE programs.

Committee of Visitor Charge (cont.)

- Assess the MSE Division's programs over five fiscal years (2018-2022)
- The components reviewed are:
 - Materials Discovery, Design and Synthesis (MDDS)
 - Condensed Matter and Materials Physics (CMMP)
 - Scattering and Instrumentation Sciences (SIS)
 - Department of Energy Established Program to Stimulate Competitive Research (EPSCoR)
 - Topical Funding Opportunity Announcements (FOAs) spanning BES with a significant component within MSE
- Includes the following Funding Opportunities and Lab Announcements:
 - FY 2018–2022 Office of Science Annual Funding Opportunity Announcements
 - FY 2018–2022 Early Career Research Program
 - FY 2018-2022 Building EPSCoR-State National Laboratory Partnerships and Implementation Grants
 - FY 2019 Computational Materials Sciences (CMS)
 - FY 2021 Scientific Discovery through Advanced Computing (SciDAC)
 - 12 Topical FOAs relevant to MSE during review period

COV Panels

- 19 COV panelists organized into 4 panels (centered on the 3 MSE components and EPSCoR program):
 1. [Scattering and Instrumentation Sciences \(SIS\) Team](#)
Lead: Zhi-Xun (ZX) Shen, Stanford University/SLAC National Accelerator Lab
 2. [Materials Discovery, Design, and Synthesis \(MDDS\) Team](#)
Lead: Rachel Segelman, University of California, Santa Barbara
 3. [Condensed Matter and Materials Physics \(CMMP\) Team](#)
Lead: John Mitchell, Argonne National Laboratory
 4. [Established Program to Stimulate Competitive Research \(EPSCoR\) Team](#)
Lead: Theda Daniels-Race, Louisiana State University
- A fifth panel (comprised of 3 panelists chosen from the other panels) was organized for parts of days 3 and 4 to cover the Topical FOAs with a significant component within MSE
 - One 2019 FOA selected: [Chemical and Materials Sciences to Advance Clean Energy Technologies and Low-Carbon Manufacturing](#)
Lead: Frances Hellman, University of California, Berkeley/Lawrence Berkeley National Laboratory

COV Members (19 total)

- COV Demographics

- Academia: 14
- DOE Lab: 5
- Funded by BES-MSE: 15
- EPSCoR State Representatives: 4
- 9 women and 10 men (non-binary representation not known)

Note: 2 COV Members have joint academic and national lab appointments

Last Name	First Name	Affiliation
Bent	Stacey	Stanford University
Cooper	Valentino	Oak Ridge National Laboratory
**Daniels-Race	Theda	Louisiana State University
Delfyett	Peter	University of Central Florida
Eom	Chang-Beom	University of Wisconsin -Madison
Frano	Alex	University of California, San Diego
Guggilla	Padmaja	Alabama A&M University
Hartley	Scott	Miami University
Hayes	Dugan	University of Rhode Island
*,**Hellman	Frances	University of California, Berkeley / Lawrence Berkeley National Laboratory
Huq	Ashfia	Sandia National Laboratories (CA)
Kilina	Svetlana	North Dakota State University
Kumar	Sanat	Columbia University
Lau	Jeanie	Ohio State University
Liu	Andrea	University of Pennsylvania
**Mitchell	John	Argonne National Laboratory
Olsen	Brad	Massachusetts Institute of Technology
**Segalman	Rachel	University of California, Santa Barbara
**Shen	Zhi-Xun (ZX)	Stanford University / SLAC National Accelerator Lab

* COV Chair ** Panel Leads

Committee of Visitors Review Detail

- COV meeting held virtually on October 23-26 11-5 ET. Agenda included presentations by DOE staff, breakout sessions for each panel (for reviewing and writing), and daily meetings of entire COV for panel updates and associated discussions.
- DOE personnel were available at all times to answer questions
- Additional information provided included:
 - Copies of the charge letter and guidance to COV members on how the review would be conducted, including a report template for each panel
 - Strategic plans, highlights, and core research proposal activities for each program within MSE
 - Summaries of the EPSCoR and Topical FOA programs
 - Copies of the plenary presentations from DOE
 - The 2018 MSE Division COV report, including the BES response

Major Findings (1)

1. The portfolio managed by MSE has exceptional breadth and depth and excellent internationally recognized scientific impact in important scientific fields that lie centrally within the BES mission. The balance of research areas is excellent (e.g. materials discovery and synthesis; characterization and technique development; discovery and use-inspired research; experiment and theory).
2. The award process is objective and fair and has resulted in a portfolio that is world class and reflects current research priorities. The program managers (PMs) do an excellent job of balancing the goals of scientific excellence and strategic planning, and of using holistic and thoughtful criteria for evaluations. PMs integrate programmatic priorities in a consistent and reasonable manner while also being open to new potentially impactful areas not incorporated in existing priorities.
3. Communications with the scientific community is excellent and has proven highly successful for setting research agenda including Topical FOAs, EFRC calls, etc. These communications enable an excellent combination of “top-down” and “bottom-up” approaches to setting scientific priorities.

Major Findings (2)

4. MSE has a notable commitment to supporting diversity and inclusion across its portfolio, both of PIs and of reviewers. Proactive efforts include: listening sessions with MSIs (minority-serving institutions), new targeted FOAs (e.g., RENEW, FAIR), attendance at conferences targeted to under-represented scientists, and the introduction of PIER plans for future proposals. Some statistics were not available; these would help the panel assess success and identify potential avenues for improvement.
5. There is a strikingly low number of proposals submitted to EPSCOR by minority-serving institutions (and potentially to the core programs as well – those statistics were not available to COV).

Major Recommendations (1)

1. In light of rising personnel and other research costs and potential flat or nearly flat budgets, maintain portfolio excellence by balancing the number and size of awards.
2. The demographic and institutional statistics of all submissions (including pre-proposals) to all programs, as well as awards, should be collected, beyond awarded PI demographics. This should be done in accordance with current and future government directives and in consultation with experts on appropriate wording for each category. This is not an MSE-specific recommendation but should be considered by BES/DOE.
3. Workloads of MSE program managers should continue to be assessed to be sure that the appropriate level of staffing support is being provided and that the number of invited full proposals is optimal to ensure a highly inclusive and world leading portfolio.
4. Attention should be paid to career development of PMs, in order to assure the continued recruiting and retaining of PMs with excellent expertise and commitment. They should be provided sufficient travel budget and opportunity to visit PIs and attend conferences including international meetings to stay engaged with state-of-the-art science and assess international competitiveness of DOE programs.

Major Recommendations (2)

5. Reviewer instructions should explicitly include a request that reviewers identify and assess *strengths and weaknesses* in all review criteria. This will provide additional valuable information to the PMs and will reduce the impact of inevitable reviewer bias.
6. MSE program managers are commended for their attention to a holistic thoughtful review process. To the extent possible, MSE (and more broadly BES and DOE) should instruct reviewers to focus on assessing scientific importance and proposal strengths and weaknesses and avoid simple metrics such as publication venue (impact factor) and number of papers published.
7. In instructions to future COVs, MSE should highlight the role and responsibility of BES for National Laboratory stewardship, including setting programmatic directions with intention to produce great science, laboratory workforce development, and maintenance of scientific expertise.

Other Comments

- The COV thanks MSE management, Division staff and program managers for their engagement with the COV including advance preparation and assistance during the COV. This allowed the COV process to be conducted efficiently and productively.
- The COV Chair commends the panel leads and panel members for their participation and thoughtful insights.
- The COV supports the five year review cycle implemented following the 2018 review
- The COV viewed the virtual meeting as accomplishing the desired goals, while noting that discussions were somewhat curtailed by the zoom format compared to in person; meetings were effective and efficient and enabled a number of participants to join who could not otherwise have participated in the COV.

Summary

- The COV commends MSE management and program managers for their dedication and skill. MSE processes, including Topical FOAs and EPSCoR programs, are fair, efficient, and professional. MSE has implemented a noteworthy strategic planning process and a commitment to holistic review of proposals with a good balance of attention to many different important review factors, resulting in a research portfolio that is outstanding on a national and international scale.