



NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

NSF 23-068

Dear Colleague Letter: DMR-NIBIB Collaboration: Exploring Fundamental Drivers of Next Generation Biomaterials for Biomedical Research

March 14, 2023

Dear Colleagues:

The National Science Foundation's Directorate for Mathematical and Physical Sciences (MPS) wishes to announce to the community a new collaboration with the National Institute of Biomedical Imaging and Bioengineering (NIBIB). This collaboration is based on a recent Memorandum of Understanding between the Directorate of Engineering (ENG), MPS, and NIBIB to encourage and foster scientific exchanges in areas of mutual interest. Specifically, this Dear Colleague Letter (DCL) invites requests to fund workshops addressing the science drivers of active matter biomaterials with the potential to advance our understanding of abiotic-biotic interfaces and be developed into next generation biomedical technologies. As described below, the Division of Materials research (DMR) within MPS and NIBIB collaboration is specifically interested in laying the scientific groundwork necessary for competitive proposals for the exploration of new biomedically-relevant active materials and the drivers needed to be medically applicable as these new materials transition from discovery to development.

BACKGROUND:

The field of biomaterials has grown from a niche within materials science to a robust discipline that has enabled significant biomedical advances. However, a major gap still exists between exciting advances in materials science and tailoring these advances towards biomedical problems. As an example, an exciting and emerging area within materials science where this is the case is in the field of active materials (also known as active matter), where responsive and dynamic materials or materials composites may play a highly impactful role in biomedical research. Here, responsive, and dynamic materials or materials composites may play a highly impactful role in biomedical research. These out-of-equilibrium material systems blend the space between chemistry, physics, mathematics, biology, and device engineering

to sense their environments and respond appropriately with independent control over temporal and spatial factors. An early stage of Square-Table workshops between NSF and NIBIB generated a review article¹ and influenced the Engineering Biology Research Consortium 2021 Engineering Biology & Materials Science Roadmap² that can be reviewed for guidance, highlighting the potential for active materials to have a major impact in biomedical engineering and future clinical practice.

OBJECTIVE:

With this DCL, DMR and NIBIB invite the submission of topic ideas for a workshop that will discuss the above areas of research. Such workshops are typically identified as conferences in the [NSF Proposal & Award Policies & Procedures Guide](#) (PAPPG) and will hereafter be referred to as conferences.

The conference should involve enough in-person or virtual participants to demonstrate community need and buy-in, while retaining the breakout and in-depth interactions characteristic of a conference rather than emphasizing the formal presentations of a symposium. In addition to academic researchers, conference participants may include relevant scientists, engineers, and practitioners from industry, federal agencies, and international organizations who represent the broad biomaterials and biomedical research communities. NSF welcomes proposals that include efforts to broaden participation of persons from underrepresented groups in STEM (such as women, underrepresented minorities, and persons with disabilities) in defining these research drivers of next generation biomaterials. Conference participants should include individuals with needed disciplinary expertise as well as an interdisciplinary worldview. Key members of each team (e.g., PI and Co-PIs) should plan to attend an in-person or virtual meeting to be held in 2023, and help develop a list of invitees, reaching out to potential invitees, develop the agenda, and shape the breakout questions. Proposals should include a deliverable of an open-access report. Funds for support staff to facilitate the conference discussion and report preparation may be included

HOW TO RESPOND TO THIS DCL:

- The anticipated budget of a conference proposal is generally limited to \$50,000, but under exceptional circumstances may be supported up to \$100,000, subject to availability of funds.
- Prior to submitting a proposal in response to this DCL, **the PI must submit a Concept Outline by email to the individuals listed below to ensure that the proposal fits the goals of this DCL.** The deadline for the Concept Outline is **May 5, 2023, 5 pm local submitter's time.**
- Concept Outline Requirements: In three or fewer pages, the outline must describe the

planned science drivers, a working title, and a statement describing how the elements described in this DCL are addressed. While a complete list of the conference participants is not required at this stage, the Concept Outline should include a list of the co-PIs and organizers of key portions of the conference, as well as a preliminary list of primary participants (virtual and/or in-person) and their affiliations. The Concept Outline should also offer a plan to ensure broad community engagement in the conference, as well as plans for the creation and dissemination of a written report. Proposers are also encouraged to point out potential links to/interest in other disciplines.

- This Concept Outline will be shared between the NSF and NIBIB program directors involved in this collaboration, constituting the DMR-NIBIB Working group, who will jointly advise on the suitability of the proposed workshop.
- If the Concept Outline is found suitable, PIs will be directed to submit the conference proposal in accordance with the guidance contained in Chapter II.F of the NSF PAPPG. The full proposal can only be submitted after invitation by the cognizant NSF Program Officer. **The email inviting the submission must be included in the conference proposal as a Single-Copy Document.**
- The conference proposal will be shared with the DMR-NIBIB Working Group for internal review.
- The title of the proposal should begin with "DMR-NIBIB Planning Workshop:" and should be submitted for consideration to the BMAT Program (program element code 7623). **The target date for proposal submission is June 8, 2023, 5 pm local submitter's time.**
- Proposals submitted by this date will be given full consideration, while processing of proposals received after this date may be delayed. Proposals or requests where PIs have not contacted one of the listed Program Officers in this DCL, will be returned without review.

WEBINAR

Link to the webinar recording:

https://players.brightcove.net/679256133001/NkgrDczuol_default/index.html?videoId=6325399715112

[Webinar slides](#)

Contact for webinar inquiries:

Christopher Alexander Finta

Program Analyst,

Division of Materials Research,

Directorate of Mathematical and Physical Sciences, National Science Foundation

Email: cfinta@nsf.gov

COGNIZANT PROGRAM DIRECTORS FOR INQUIRIES:

Abraham Joy,
Program Director,
Division of Materials Research, MPS, NSF
Email: ajoy@nsf.gov

Shadi Mamaghani,
Program Director,
Division of Materials Research, MPS, NSF
Email: smamagha@nsf.gov

Luisa Russell,
Program Director,
National Institute of Biomedical Imaging and Bioengineering, NIH
Email: luisa.russell@nih.gov

Sincerely,

Sean L. Jones
Assistant Director
Directorate for Mathematical and Physical Sciences

REFERENCES:

1. Perspective: “The living interface between synthetic biology and biomaterial design”, Nature Materials, vol 21, pages 390–397, April 2022. <https://doi.org/10.1038/s41563-022-01231-3>
2. Engineering Biology Research Consortium (EBRC): “Engineering Biology & Materials Science - A Research Roadmap for Interdisciplinary Innovation”, January 2021. <https://roadmap.ebrc.org/2021-roadmap-materials/>