Charge to the MPSAC Subcommittee on *MPS and the Living World*

A subcommittee of the MPSAC is hereby formed and charged to study and provide recommendations to the MPS concerning its contribution to the future of biotechnology.

Biotechnology is defined as a broad discipline in which biological processes, organisms, cells, or cellular components are harnessed to develop new technologies. New tools, techniques, and products developed by biotechnologists are increasingly employed to advance research in industries from agriculture to medicine, from electronics to energy, from advanced manufacturing to digital communication, and many others.

Recently, the NSF Director reported to Congress on *Industries of the Future,* which included the need for advances in biotechnology to fuel and grow the bioeconomy. These advances, in turn, will necessitate fundamental research in both mathematical and physical sciences. All divisions in MPS explore the "living" world from different perspectives. Over the past decade, many divisions have developed new programs and formed convergent interactions with biological sciences and bioengineering. Going forward, MPS strives to develop a long-term strategy to harness the diverse capabilities of the directorate to tackle the most challenging fundamental science questions, which, once elucidated, will significantly accelerate future innovations in biotechnology.

Considering current MPS efforts, as exemplified by the Chemistry of Life Processes (CHE), Physics of Living Systems (PHY), Mathematical Biology (DMS), and Biomaterials (DMR) programs in MPS, this MPS-AC subcommittee is charged to explore the opportunity space and recommend both short- and long-term strategies for MPS that provide insights into the following questions:

1. What are the fundamental science questions that, if answered, could significantly accelerate future biotechnologies?
2. Which of these science questions are unique to the MPS communities? And what new tools and/or techniques are needed to address these science questions?
3. How could convergence (or cooperation) among MPS disciplines advance the field of biotechnology?
4. How can partnerships with other parts of NSF, with other agencies, and with private foundations and/or companies advance these goals?
5. In addition to MPS contributions to the development of fundamental knowledge in biotechnologies, what areas of biotechnology might advance fundamental science in AST, CHE, DMR, DMS, and PHY?

Updated Timeline:

Charge delivered:	October 2020
Interim check-in:	March 2021
Final white paper:	September 2021

The MPSAC Chair will be invited to the subcommittee kickoff meeting to deliver this charge and to interim updates with the Subcommittee, as the Subcommittee Chair or Co-Chairs deem appropriate. The interim updates will detail progress and interim (draft) findings. The final white paper will be due no later than September 2021. Recommendations to the MPS Directorate concerning its contribution to the future of biotechnology will be presented at a future MPSAC meeting. The Chair or Co-Chairs of the subcommittee should coordinate delivery of materials with the MPSAC Chair in advance of the MPSAC meeting. Presenting to the MPSAC can be done virtually or in-person.

The subcommittee will terminate once the MPSAC has accepted the final white paper and determined that no further edits or substantive changes need to be made by the subcommittee.

Resources

NSF will arrange for and host in-person or virtual meetings of the subcommittee as required by the Chair or Co-Chairs of the subcommittee.

Original 4/1/2020
Timeline Updated 10/6/2020