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NSF perspectives on research opportunities and progress towards building a synthetic cell

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Abstract

Building a synthetic cell is a grand challenge in the biological sciences and engineering. While the research community has made tremendous progress in the past decade in designing and building genetic circuits, precision genome editing, and the complete assembly of synthetic genomes of both bacterial and eukaryotic organisms, much less progress has been made on assembling the rest of the components of a cell, whether for purposes of biomanufacturing, for production of novel materials, or for testing hypotheses regarding the fundamental principles driving organelle assembly. There are opportunities to take advantage of advances in nanotechnology to enable the building of a synthetic cell – and to learn about assembly of complex nano-machines such as those found in biology that may inform progress in nanotechnology.

Bionote

Theresa Good is currently the Deputy Division Director of Molecular and Cellular Biosciences, in the Biological Sciences Directorate at NSF. She has served as program director in programs related to synthetic biology in both the Engineering and Biological Sciences Directorates before taking on her current role. Prior to joining NSF, Dr. Good was on the Chemical Engineering faculty at Texas A&M University and the University of Maryland Baltimore County. She has spent more than 20 years doing research at the nanoscale, solving problems at the interface of engineering and the biological sciences, with a focus on protein aggregation and Alzheimer's disease.