**Inorganic Biohybrids: Advancing Artificial Photosynthesis**
Hosted by the Chemical Sciences Roundtable
February 10, 2020
12:00—1:30 PM EST

Scientists are now producing photosynthetic systems by coupling inorganic light harvesting complexes with biological components. These inorganic biohybrids (*biohybrid complexes or systems, bioinorganic hybrids, inorganic-biological hybrid systems, or hybrid biological-inorganic systems*) combine inorganic or artificial constituents with biological components, such as enzymes, cells, or microorganisms, to create systems or complexes that can accomplish tasks that wholly natural ones cannot achieve. This nascent field has great potential given the vast array of chemistries that might now be made photosynthetic, including valuable biofuels, specialty chemicals, drugs, and plant nutrients. This webinar, the first of three hosted by the Chemical Sciences Roundtable in 2020, will focus on the use of biohybrids to achieve highly efficient solar-to-chemical energy conversion, that is, applications in artificial photosynthesis.

## Agenda

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| 12:00 PM | **Welcome and Opening Remarks**<br>Ellen Mantus, *CSR Director* |
| 12:05 PM | **Semi-Artificial Photosynthesis: Biohybrids as model systems for understanding essential processes in photocatalysis**<br>Katherine Brown, *National Renewable Energy Laboratory* |
| 12:35 PM | **Artificial Leaf and Bionic Leaf: Food and Fuel from Sunlight, Air and (Any) Water**<br>Daniel Nocera, *Harvard University* |
| 1:05 PM | **Discussion** |
| 1:30 PM | **Webinar Concludes** |

## Speaker Biographies

**Katherine Brown** is Researcher IV for chemistry at the National Renewable Energy Laboratory (NREL). Her research focuses on understanding energy transduction in biological and biohybrid systems. Her biohybrid work centers on the synthesis and characterization of semiconductor nanoparticle biohybrid complexes, with several redox enzymes, including [FeFe]-hydrogenase from Clostridium acetobutylicum, ferredoxin NADP+ reductase, and nitrogenase. The characterization of these complexes has focused on the thermodynamics and orientation of complex assembly, the photocatalytic activity and turnover frequency of the enzymes, the light capture charge transfer mechanisms, and the quantum yield of the complexes. The study of these biohybrid complexes has provided new insights into how enzymes control interfacial electron transfer, as well as novel design parameters for improving productive light-driven electron transfer from nanoparticles to surface adsorbed catalysts. Dr. Brown received her Ph.D. from the Massachusetts Institute of Technology in 2008.

**Daniel G. Nocera** is the Patterson Rockwood Professor of Energy at Harvard University. Widely recognized in the world as a leading researcher in renewable energy, he is the inventor of the artificial leaf and bionic leaf. Other areas of interest include the first measurement and theory of proton-coupled electron transfer and its application to radical enzymology, the development of new cancer therapies by creating nanocrystal chemosensors for metabolic tumor profiling and the design of spin frustrated materials to explore exotic states arising from highly correlated spins. Dr. Nocera's research contributions in renewable energy have been recognized by several awards, including the Leigh Ann Conn Prize for Renewable Energy, Eni Prize, IAPS Award, Burghausen Prize, and the United Nation's Science and Technology Award and from the American Chemical Society the Inorganic Chemistry, Harrison Howe. Kosolapoff and Remsen Awards. He is a member of the American Academy of Arts and Sciences, the National Academy of Sciences, and the Indian Academy of Sciences. He was named as 100 Most Influential People in the World by Time Magazine and was 11th on the New Statesman's list on the same topic, and he is a frequent guest on TV and radio and is regularly featured in print. Dr. Nocera earned his BS degree at Rutgers University and his PhD at Caltech.