

Call for Proposals

The Energy & Biosciences Institute (EBI) expects to have funding available from Shell in 2019 through the EBI-Shell Research Program to provide support in the area of Biosciences & Bio-Engineering addressing fundamental questions in the area of energy transition. Currently we are interested in research focused on the capture, fixation, and interconversion of CO₂ into chemicals for advanced energy storage, dense energy carriers, or high value materials. These reactions may be mediated by biological or hybrid biochemical-chemical-electrochemical processes. As such, biological sciences including but not limited to synthetic biology, biochemistry, and biomimicry are important areas of interest. Specifically, at this time we are only considering projects that identify non-traditional routes of energy and reducing equivalent uptake by microorganisms. These should rely solely on soluble inorganic energy and carbon sources to circumvent the well-known mass transfer limitations that are inherent to gas fermentation processes. Examples of this might include autotrophic microbial metabolisms that rely on the oxidation of ammonia, ferrous iron, or sulfide to provide the energy and reducing equivalents for carbon fixation and transformation. But many other natural and synthetic possibilities exist. The use of chemolithotrophic metabolisms based on soluble inorganic energy sources like ammonia, metal ions, or sulfur also theoretically enable the capture and conversion of solar energy through ion recycling using electrochemical reduction. Such a process would provide a clear route for the integration of renewable energy into the candidate bioprocess. Examples of some processes are outlined in Figure 1 below.

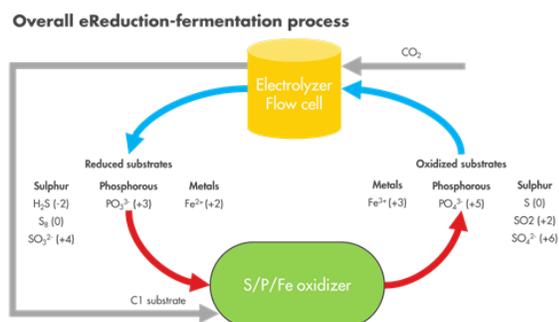


Figure 1. Model hybrid bio-electrochemical processes that use electrical energy to provide reducing equivalents in the form of ionic species (Fe²⁺, PO₄³⁻, HS⁻, or NH₄⁺) to chemolithotrophic organisms that can use these to drive carbon uptake and conversion.

The Biosciences & Bio-Engineering program

The Biosciences & Bio-Engineering program supports PIs at UC Berkeley, University of Illinois Urbana-Champaign, and the Lawrence Berkeley National Laboratory. Currently this program is inviting submission of proposals that outline ideas for research and analyses focused on chemolithoautotrophy and chemolithoheterotrophy (mixotrophy) that use non-traditional routes of energy and reducing equivalent uptake relying on soluble inorganic energy and carbon sources. Annual project funds will be capped at \$250,000 each year over a maximum of three years. We expect to fund multiple projects in this area joining our current expanding research portfolio. Because the problems posed are complex, we envision that some of the proposals will involve multiple investigators who will contribute complementary expertise to a team approach to the problem. However, each proposal should have a single PI who can serve as a point person for the interaction between EBI and the team. PI's are encouraged to reach out to the Shell scientific liaisons David Parker (David.A.Parker@shell.com) or Yi Liang (Yi.Liang@shell.com) to establish

a collaborative proposal that includes Shell personnel and facilities. In this way prospective PI's can leverage their funding to increase the scope of their projects. Broader operational (non-technical) inquiries should be directed to EBI administration at ebiadmin@berkeley.edu.

The proposals will be evaluated by a scientific committee appointed by the EBI-Shell Steering Committee and successful applications will be determined based on scientific quality, programmatic fit, and prior experience & success of the PI in the research area of interest. The EBI will not provide copies of reviews of proposals to proposers.

INSTRUCTIONS

- 1) **Applicants must follow the EBI-Shell instructions provided to correctly submit proposals** (<https://energybiosciencesinstitute.org/wp-content/uploads/2019/08/EBI-Shell-2019-BIO-E-Proposals-instructions.pdf>).
- 2) **IMPORTANT – LBNL APPLICANTS ONLY**: Principal Investigators need to submit their proposal to the eSRA system in parallel, as this will prompt the DOE foreign review process once all relevant information has been provided.
- 3) In addition, a two-page “NSF-style” curriculum vita of all principle investigators is required, as well as a brief description of available facilities. *Any images can be provided as appendices and will not count against the proposal page limit.*
- 4) Proposals are due by **5:00 p.m. Pacific Time on Friday, October 18, 2019**. Responding PIs should work with their institutional Research Administrators to develop an appropriate budget using the budget EBI-Shell Budget template (https://energybiosciencesinstitute.org/wp-content/uploads/2019/08/2019_EBI-Shell_Budget_Template.xlsx) **Applications not using this template will be eliminated from further consideration.**
- 5) Please review and comply with the following deadlines and non-negotiable requirements per BEST region pre-award policy:
 - a. Final budget, in Excel format only, due to Sean Sotelo, sotelo@berkeley.edu, no later than 5:00 PM (Pacific) by 10/08/2019 (i.e., 10 business days before the EBI-Shell deadline of 10/18/2019)
 - b. Final project title by 10/08/2019. This is necessary for the Phoebe proposal record and required institutional documentation.
 - c. Final project period by 10/08/2019. This is required for Phoebe proposal record and required institutional documentation.
 - d. Name(s) and contact information of the person(s) responsible for budget development and institutional /administrative documentation.
- 6) PIs will be notified of funding decisions by Friday, November 1, 2019. Funded proposals will have a start date of January 1, 2020.

- 7) For technical or scientific questions, please contact EBI Director, John Coates, jdcoates@berkeley.edu. For administrative or general support questions, please contact ebiadmin@berkeley.edu.