

National Science Foundation's Division of Chemistry office hour focusing on a Disciplinary Research Program, the *Chemistry of Life Processes (CLP) Program*.

October 13th at 4:00 pm ET

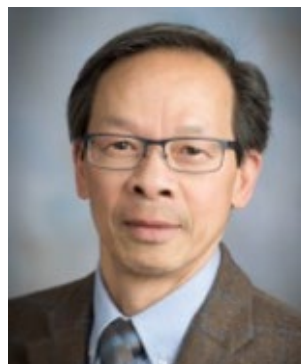
This office hour will feature a discussion of the program scope, funding priorities, program portfolio, and recent research highlights, followed by a Q&A session.



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Program Director
CLP (on detail), CHE, MPS



Christine Chow
Program Director
CLP, CHE, MPS



P. Shing Ho
Expert
CLP, CHE, MPS

Chemistry of Life Processes (CLP) Program in the Division of Chemistry



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Synopsis of the Chemistry of Life Processes (CLP) Program in the Division of Chemistry

The Chemistry of Life Processes (CLP) Program supports fundamental, experimental and computational studies at the interface of chemistry and biology. Such studies should promote the fundamental understanding of the molecular underpinnings of life processes. The proposed research should be based on *innovation(s) in chemistry* and address an *important question about a biological process*.

Proposals should make clear both the original contribution to the chemistry knowledge that is being pursued and how the research project will directly address a biologically relevant question.

The scope of the program is broad, reflecting the power of chemistry and diversity of biology.



Synopsis of the Chemistry of Life Processes (CLP) Program in the Division of Chemistry

Subject areas include:

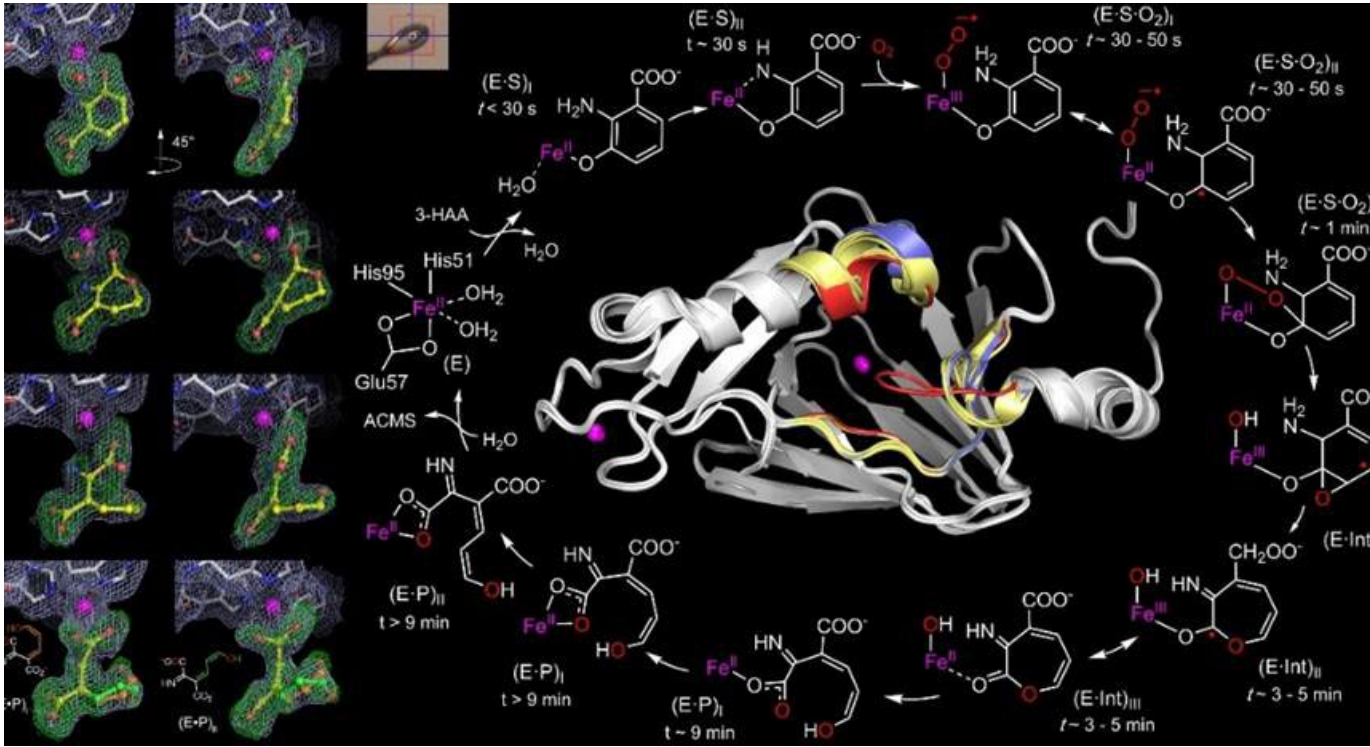
- bioorganic and bioinorganic chemistry
- carbohydrate chemistry
- chemical biology
- lipids, membranes, and membrane-proteins
- nucleic acid chemistry
- proteins, enzymes

Research projects must *use or create innovations in chemistry that advance the understanding of biological function*. Chemical methods development is also acceptable when such methods are applied to answering specific biological questions.

Other topics of interest include:

- the development and application of bio-orthogonal chemistry for probing cellular function
- biomolecular design and synthesis aimed at understanding biological function
- the use of theory, computation, modeling, and simulation as applied to the chemical aspects of biological systems
- chemical aspects that underlie the function of the brain

Highlight: Observing 3-hydroxyanthranilate-3,4-dioxygenase in action through a crystalline lens



The synthesis of quinolinic acid from tryptophan is a critical step in the *de novo* biosynthesis of nicotinamide adenine dinucleotide (NAD⁺) in mammals. **Dr. Aimin Liu and his group at U Texas-San Antonio** solved the missing piece of the information by investigating a dioxygenase that regulates quinolinic acid levels. The results from this project provide a comprehensive view of the dioxygenase mechanism by enabling step-by-step visualization of the catalytic cycle and the protein dynamics during catalysis. The results also reveal how the enzyme regulates metabolic pathway product distributions, including the non-enzymatic product of biologically significant compounds. This knowledge will help to understand NAD⁺ hemostasis, immune regulation, and oxygen activation and utilization. This project was funded by the Chemistry of Life Processes (CLP) Program in the Division of Chemistry (**CHE-1623856** and **CHE-1808637**).

The figure shows seven intermediate crystal structures of 3-hydroxyanthranilate-3,4-dioxygenase (HAO) that were determined during the *in crystallo* reaction;

Figure credit: Aimin Liu and his group. This work was published in *PNAS*, **2020**, *117*, 19720-19730.⁵

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Note: The CLP Program is not interested in projects that are disease-related or that have drug discovery/design/development goals.

Several Resources for Identification of the Best Funding Sources for a Project

- 1) Carefully read the NSF Program Synopses found on the webpages of the Programs (links to all CHE programs are here: <https://www.nsf.gov/funding/programs.jsp?org=CHE>; link to a specific Program (SYN, as example) is here: <https://beta.nsf.gov/funding/opportunities/chemical-synthesis-syn-0>)
- 2) Look up awards made by these programs (see bottom link called “Browse projects funded by this program” on each Program’s website, e.g., you would find these results by following the link on the CLP website: <https://www.nsf.gov/awardsearch/advancedSearchResult?ProgEleCode=6883&BooleanElement=Any&BooleanRef=Any&ActiveAwards=true#results>)
- 3) Identify the people who have the best research closest to your project and see where they get funding from the acknowledgments in their papers or in their public presentations.
- 4) Seek advice from a mentor in your research area, at your institution or externally.
- 5) Sign up to the Newsletter of the Division of Chemistry such that you learn about upcoming NSF funding opportunities: https://nsf.gov/news/news_summ.jsp?cntn_id=298705&org=CHE&from=news
- 6) Volunteer to serve as reviewer for NSF Chemistry Programs at https://www.surveymonkey.com/r/CHEM_NSF?sm=Zu33yLGzBm0CsSQj%2fO7qL8x8B20D0BEKJDZyRVWoAIE%3d, which will give you a chance to review and learn from proposals considered by these programs.
- 7) Check ACS for (early career) faculty workshops that include sessions on research project design and proposal writing.
- 8) Find PIs who have received NSF awards from Chemistry Programs you target and may be willing to provide feedback on your project and/or share funded proposals.

Submit a White Paper

Contact PDs in the Program to which you consider submitting an application for funding.

It would be useful to provide the PD(s) with a concise and clear white paper that includes:

- What is the research gap or need that will be filled?
- What hypotheses will be tested?
- What experiments could disprove the hypotheses?
- Why are the efforts important/needed?
- Who will be the researchers who will look forward to see your results and consider them when doing their own research?
- What are the expected innovations in chemistry?
- What specific biological problem will be impacted?
- How broadly applicable are the research results to address similar or more advanced systems?

Providing specific information is helpful; for example, stating generally that biologists may use a tool the PI creates is not as useful as highlighting a few scientists who work in a research area who will be directly impacted by the outcome.

When to Apply to the Chemistry of Life Processes (CLP) Program

PROGRAM SOLICITATION NSF 22-606

Division of Chemistry: Disciplinary Research Programs: No Deadline Pilot (CHE-DRP:NDP)

https://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=506080&ods_key=nsf22606

Full proposals are accepted anytime starting September 1, 2022. This pilot will run for at least one year and its continuation will be evaluated annually.

How to Stay Informed about the Division of Chemistry

Links to subscribe to the Division of Chemistry Newsletter

https://nsf.gov/news/news_summ.jsp?cntn_id=298705&org=CHE&from=news

Links to volunteer to become a reviewer and subscribe to NSF News are on the bottom right section of the CHE webpage

<https://www.nsf.gov/div/index.jsp?div=CHE>

Awards/Search Awards/ Advanced Search

<https://www.nsf.gov/awardsearch/advancedSearchResult?ProgEleCode=6883&BooleanElement=Any&BooleanRef=Any&ActiveAwards=true#results>

Use Program Element Code **6883** for Current and/or Expired CLP awards

