

Jenny Lockard Laboratory

The material synthesis and characterization aspects of my research program are amenable to undergraduate research. Projects will be designed to be completed within the 15-month time frame of the program. At the beginning of the project the Scholar would be tasked with making and characterizing one or more metal-organic frameworks (a type of porous solid-state material used for catalysis, gas storage, sensing and other applications). During initial meetings with the Scholar, I will introduce our group's research goals in studying these materials, while getting a sense of the student's research interests and background. Once we select a suitable framework to focus on, I will pair the Scholar with a graduate student in the group who would first help teach the relevant steps of the synthesis and characterization and then be available for help in the lab as the student Scholar takes on these tasks independently. After the first month or so, once trained, the Scholar will have an active role in both making these materials and characterizing them using crystallographic and spectroscopic means. Through this project the Scholar will develop laboratory research skills in both materials and inorganic synthesis as well as experience in using a suite of characterization tools such as X-ray diffraction and UV visible diffuse reflectance. Furthermore, I will help the Scholar develop scientific writing and presentation skills as well as skills in conducting effective literature searches.

As a Mentor in this program, I anticipate meeting with the student Scholar one-on-one (or along with the designated graduate student mentor) to discuss research results and to gauge overall progress on the research project and in the program in general at least once a week (more frequently during the summer months) These informal meetings would be an opportunity for me to provide feedback and to hear about any issues the student may be experiencing. These individual meetings would be supplemented by our weekly group meetings that can be scheduled each semester for a day/time when the student Scholar is available.

In addition to laboratory research experience, student Scholars need to become proficient in effective dissemination of research results and scientific communication to prepare for graduate school and future leadership roles in research and innovation. My role would be to provide mentorship and opportunities for the Scholar to develop this full research skill set. Scholars will present the results of their research during group meetings which will give them practice in presenting their work. Part of the feedback from the group on these presentations would include pointers to help improve oral communication skills. I will solicit one or two written reports from the Scholar over the duration of the fellowship as a way for them to hone skills in scientific writing and surveying the relevant literature. Furthermore, if the research project leads to publications, the Scholar would have an active role in preparing manuscripts for submission to peer reviewed journals.

Network-based approaches will be employed to help Scholars feel welcomed and respected within our lab. Students having frequent interactions with both their peers and the faculty mentor during the program, which has proved successful for improving a sense of belonging and social connection. The Scholar will be treated as a respected and valuable member of the team and will engage in meaningful scientific research that supports our overall research program. Real work assignments during an internship can improve a sense of belonging and enhance their science identity. As a mentor, I will actively encourage contributions from the Scholar in our weekly group meetings, an informal friendly environment, by suggesting the Scholar share interesting results with the group and by discussing why the result is significant prior to group meeting.