

SLATT UNDERGRADUATE RESEARCH FELLOWSHIP FINAL REPORT

SCHOLAR NAME:	Emma Kerr
FACULTY ADVISOR:	Dr. Jennifer Schaefer
PROJECT PERIOD:	Spring 2019 – Spring 2021 (funded during Fall 2020)
PROJECT TITLE:	Liquid-Crystalline Ion Conductors: Improving Li-Ion Battery Performance
CONNECTION TO ONE OR MORE ENERGY-RELATED RESEARCH AREAS (CHECK ALL THAT APPLY):	<input checked="" type="checkbox"/> Energy Conversion and Efficiency <input type="checkbox"/> Sustainable and Secure Nuclear <input checked="" type="checkbox"/> Smart Storage and Distribution <input type="checkbox"/> Transformation Solar <input type="checkbox"/> Sustainable Bio/Fossil Fuels <input type="checkbox"/> Transformative Wind

MAJOR GOALS AND ACCOMPLISHMENTS

Summarize your research goals and provide a brief statement of your accomplishments (no more than 1-2 sentences). Indicate whether you were able to accomplish your goals by estimating the percentage completed for each one. Use the next page for your written report.

RESEARCH GOALS	ACTUAL PERFORMANCE AND ACCOMPLISHMENTS	% OF GOAL COMPLETED
Further understand the value of optimized battery systems	I was able to learn about the potential future and current progress that lithium-ion batteries uphold through reading research papers and discussions with my lab mentors.	100
Research, select, and analyze multiple fabrications of liquid-crystalline conductors	Full fabrication of multiple liquid crystals occurred, but the complete analysis was only partially followed through with. Therefore, comparison of each molecule was not completed.	60
Familiarize with lab protocol, research publication, grant writing, and other behind the scenes skills	As an undergraduate, lab research has allowed me to expand my interest in my major and opened my eyes to many possible paths after college. I have developed many skills that I could not any other way.	90
Select a conductor that is favorable to Li-Ion systems and can produce better energy outcomes	The final selection of a Li-Ion system was incomplete due to confounding environmental consequences. I hope to continue research to come to a more solid conclusion.	50

RESEARCH OUTPUT

Please provide any output that may have resulted from your research project. You may leave any and all categories blank or check with your faculty advisor if you are unsure how to respond.

CATEGORY	INFORMATION
EXTERNAL PROPOSALS SUBMITTED	
EXTERNAL AWARDS RECEIVED	
JOURNAL ARTICLES IN PROCESS OR PUBLISHED	
BOOKS AND CHAPTERS RELATED TO YOUR RESEARCH	
PUBLIC PRESENTATIONS YOU MADE ABOUT YOUR RESEARCH	
AWARDS OR RECOGNITIONS YOU RECEIVED FOR YOUR RESEARCH PROJECT	
INTERNAL COLLABORATIONS FOSTERED	
EXTERNAL COLLABORATIONS FOSTERED	
WEBSITE(S) FEATURING RESEARCH PROJECT	
OTHER PRODUCTS AND SERVICES (e.g., media reports, databases, software, models, curricula, instruments, education programs, outreach for ND Energy and other groups)	

RESEARCH EXPERIENCE

Please let us know what you thought of your research experience: Did this experience meet your expectations? Were lab personnel helpful and responsive to your needs? What else could have been done to improve your experience or achieve additional results?

I absolutely love working in Dr. Schaefer's lab. Although there are days that drag with tedious tasks and mistakes that slow progress, I have greatly enjoyed developing my scientific imagination as I become more knowledgeable on chemical engineering specifics. I have made friendships,

mentorships, and value the people in the lab just as much as the work. I am very interested in battery development, as I think it will play a huge role in technological progress over the next decade. The graduate student that I have been working under returned home winter break of 2019-2020 and has since not been able to return to Notre Dame. That virtual mentorship has been the most challenging and delayed progress, but I am hoping it will not remain this way after returning to campus this spring.

