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The HOWARD P. ISERMANN
DEPARTMENT OF CHEMICAL AND
BIOLOGICAL ENGINEERING

CBE Seminar Series – Fall 2021

Dr. Julie Champion

Associate Professor | School of Chemical & Biomolecular Engineering
Georgia Institute of Technology

Seminar: Wednesday, September 29, 2021

9:30 a.m. (ONLINE)

WebEx link: <https://rensselaer.webex.com/rensselaer/onstage/g.php?MTID=e677a49d9b45d83ead34afb6b8e2634ba>

Password: CBEseminar

“Self-Assembled Protein Vesicles for Drug Delivery and Biocatalysis”

Abstract:

Protein vesicles incorporating functional, globular proteins have potential in a number of bio-applications such as drug delivery, biocatalysis, and sensing. We have previously created protein vesicles from mCherry-zipper-ELP protein complexes where ELP is a thermo-responsive elastin-like polypeptide, zipper is a coiled-coil, and mCherry is a model folded protein. As we utilize these vesicles, we have replaced mCherry with more useful functional proteins and have engineered the vesicles to provide both stability and stimuli responsiveness. We implemented non-natural amino acid incorporation to enable photocrosslinking strategies to stabilize vesicles and control their swelling and release of cargo as a function of salt concentration. We have modified the ELP amino acid sequence to create vesicles that are pH sensitive and swell or disassemble at acidic pH. With this information, we have demonstrated assembly of biocatalytic vesicles with significant improvements in activity over soluble enzyme and produced vesicles for drug delivery capable of carrying and releasing therapeutic cargoes. The wide range of vesicle properties and functions exhibited in these examples, highlight the versatility of protein vesicles as functional and responsive protein materials.

Biography:



Julie Champion is an Associate Professor in the School of Chemical & Biomolecular Engineering at Georgia Institute of Technology and a member of the Institute for Bioengineering and Biosciences and the Bioengineering Program. She earned her B.S.E. in Chemical Engineering from the University of Michigan and Ph.D. in Chemical Engineering at the University of California Santa Barbara as a National Science Foundation graduate fellow under the advisement of Dr. Samir Mitragotri. She was a National Institutes of Health postdoctoral fellow at the California Institute of Technology in the lab of Dr. David Tirrell. Professor Champion's current research focuses on design and self-assembly of functional materials made from engineered proteins for applications in immunology, cancer, and more recently, biocatalysis. Dr. Champion has received a BRIGE award from the National Science Foundation, the Georgia Tech Women in Engineering Faculty Award for Excellence in Teaching, and the Georgia Tech BioEngineering Program Outstanding Advisor Award. In 2021, she was named an American Chemical Society Women Chemists Committee Rising Star and elected as a fellow of the American Institute for Medical and Biological Engineering.

Due to COVID-19, no refreshments will be available for this seminar.

For more information, please contact Lisa Martin (swishl@rpi.edu) or Helen Zha (zhar@rpi.edu)