DEPARTMENT OF CHEMICAL AND BIOMOLECULAR ENGINEERING

UNIVERSITY OF DELAWARE
ENGINEERING

2023 SEMINAR SERIES

Attend virtually: https://udel.zoom.us/j/91386404306

SYNTHETIC BIOLOGY FOR ENHANCED MACROMOLECULE FUNCTION AND ANIMAL PERFORMANCE

NOV 3 | 10:00 AM | 102 COLBURN LAB

QING SUN

TEXAS A&M UNIVERSITY

Herbert Richardson Fellow Assistant Professor

A central goal of synthetic biology is to predictably and efficiently re-engineer DNA, RNA, protein, and living organisms to carry out specific biological tasks. In this talk, I will highlight our work on engineering macromolecule and bacteria-animal interactions for biomedical and environmental applications. Firstly, messenger RNA-based vaccines efficiently fight against viral diseases including COVID-19. However, a key limitation of mRNA vaccines is the inherent chemical instability. As a result, mRNA vaccines require stringent cold chain conditions for manufacturing, storage, and worldwide distribution. I will talk about our efforts to recode mRNA toward thermally stable and highly efficient mRNA vaccines. Secondly, programming animals' physiology and behavior play a significant role in pest control, environmental remediation, and human health. Although there have been many advances in the bio-computational design of living systems, programming animal behavior and altering animal physiology remain challenges because of the system complexity. I will present our bacteria-animal symbiont system for engineered animal physiology and behaviors through logic gates. Last but not least, proteins are building blocks for living organisms. I will discuss our efforts using protein engineering to address environmental and biomedical needs including plastics degradation, methane fixation, and artificial bi-specific antibody assembly for cancer diagnosis and therapy. All these collective efforts demonstrate the power of synthetic biology to solve urgent biomedical and environmental problems.

ABOUT THE SPEAKER

Dr. Qing Sun is Herbert Richardson Fellow Assistant Professor in the Artie McFerrin Department of Chemical Engineering at Texas A&M University. In 2015, she obtained her Ph.D. from the Chemical and Biomolecular Engineering department at University of Delaware under the mentorship of Professor Wilfred Chen. After that, she did postdoc training under the supervision of Professor Dr. Timothy K. Lu in the Synthetic Biology Center at MIT. Dr. Sun is awardee of the NIH Stephen I. Katz Early Stage Investigator R01 Grant. Her research interests are synthetic biology with advancing designs and applications. Using expertise in deep learning and experiments, she aims to develop techniques to improve human health, tackle environmental challenges, design smart materials, and alleviate the energy crisis.