Synthetic Biology Approaches toward New Materials

Abstract:

A central question facing the bottom-up approach for material design is how to transfer the function at the molecular level to the material properties at the macroscopic level. In the past few years, there has been a growing trend of designing materials with dynamically tunable properties. These 'smart' materials necessitate a new level of control over the structural and functional properties of macromolecules as well as their interactions with external stimuli. Although natural evolution has led to the creation of a vast number of protein molecules with extraordinary structural and functional diversity, such an ecological diversity has yet to be fully utilized to design materials. Taking advantage of some emerging synthetic biology tools and principles, we aim to directly assemble engineered protein molecules into functional materials for a variety of applications ranging from regenerative medicine to environmental remediation.

Biography

Dr. Fei Sun is currently an Assistant Professor at the Department of Chemical and Biological Engineering, the Hong Kong University of Science and Technology. Before joining HKUST in 2014, Dr. Fei Sun worked on protein engineering and directed evolution as a postdoctoral researcher with Frances H. Arnold, the Nobel Laureate in Chemistry 2018, at the California Institute of Technology. He obtained his PhD in Chemistry at the University of Chicago in 2012 and BS degree at Peking University in 2007. His work has been recognized with several awards, including the Chicago Biomedical Consortium Scholar Award, the Everett E. Gilbert Memorial Prize in Organic Chemistry, and Royal Society of Chemistry *Molecular System Design & Engineering* 2020 Emerging Investigator. His recent research interests include protein engineering, protein materials and synthetic biology.