Chemical & Biological Engineering Seminar

February 27, 2019, 10 AM, Farris Engineering Center room 1000

Engineering Organizational Complexity in Biological Systems

William Bricker
Massachusetts Institute of Technology

Abstract: Biological light-harvesting systems have evolved unique hierarchical molecular architectures in which energy from sunlight is transferred to photosynthetic reaction centers at near unity efficiencies. The organization of these molecular light-harvesting units is one key to understanding the energy transfer pathways within these systems, and this organizational structure can be modeled using computational chemistry methodologies. In addition, a synthetic scaffolding tool known as DNA nanotechnology enables the precise placement of light-harvesting molecules in a hierarchical manner, enabling the bio-mimicry of natural light-harvesting complexes with DNA. During this seminar I will talk about: (1) the unique hierarchical arrangement of chromophores in natural light-harvesting complexes, (2) recent advances in structural DNA nanotechnology, (3) and the application of DNA nanotechnology as a scaffold for synthetic light-harvesting materials, all from the point of view of molecular, atomic, and electronic chemical theory.

Short Bio: Dr. William Bricker investigates the excitonic structure-function relationship of natural and synthetic light-harvesting systems using molecular-, atomic-, and electronic-scale chemical theories. He earned his Ph.D. in the Department of Energy, Environmental & Chemical Engineering at Washington University in St. Louis after researching the excitation energy transfer pathways in natural light-harvesting complexes using first principles calculations. He then joined the Department of Biological Engineering at MIT as a postdoctoral research associate, in order to study the emerging field of DNA nanotechnology and its potential application as a synthetic light-harvesting material.