Advances in recombinant DNA technology have expanded our ability to design and produce new protein-based materials with superior control over the biomacromolecule length, sequence, and structure for biomedical applications. Despite these positive attributes, protein-based materials still lack the chemical diversity of their synthetic analogues due to the limited repertoire of canonical amino acids. This limitation significantly restricts the available chemical design space (and thus the function) of protein-based biomaterials. In our quest to overcome this evolutionary constraint, we are inspired by a solution offered by Nature: leveraging specific chemical transformations to modify proteins with non-proteinogenic building blocks, a process called post-translational modification (PTM), which expands the chemical diversity of the proteome by more than two orders of magnitude.

Our focus is to reprogram unique PTMs to synthesize de novo designed hybrid biopolymers with programmable self-assembly. Our efforts are motivated to answer this fundamental question: What advanced properties can be encoded in protein-based materials by expanding the chemical design space from canonical amino acids to novel PTMs? Answering this fundamental question paves the way for utilizing these hybrid biopolymers for new biomedical applications.

Tuesday, October 29, 2019
at 4:15 p.m., in Stowell Hall, Room 211

Light refreshments will be served. All are welcome.