Applying Biological Strategies for Self-Assembly of Composite Nanomaterials

Biological systems rely on stochastic interactions between energy-dissipative and thermodynamic processes to assemble nanostructures and systems that are capable of responding to physiological signals and/or external stimuli. Active transport systems, consisting of a class of proteins known as biomolecular motors, are fundamental to many of these dynamic self-assembly processes, and offer a powerful model system for systems engineering at the nanoscale. Current research in my laboratory is focused on (1) understanding how active transport systems drive the assembly of complex materials, and (2) exploiting mimetic approaches to engineering nanomaterials with novel functionality. I will discuss three examples of hybrid self-assembled systems that our laboratory has developed using cytoskeletal motors and filaments.