The Champion research group broadly focuses on developing biologically active nanomaterials for therapeutic applications in cancer, wound healing, and autoimmune diseases. We make materials from proteins, allowing us to tune both the specific biological interactions and the physical properties.

“Protein Assembly to Create Therapeutic Materials”

Protein drugs can provide a key advantage over small molecule drugs; they evolved to perform their function, while small molecules are often selected for “best” function compared to a pool of candidates. However, proteins can present challenges in delivery that must be overcome in order to be used as therapeutic drugs. Their folded structure is critical to their biological function, but makes them sensitive and difficult to package. This structure also provides an opportunity to create materials from proteins that is not available for small molecules. The main goal of our work is to engineer materials made directly from therapeutic proteins. This is accomplished through a combination of self-assembly and/or bio-conjugation processes. The ability to control these processes is essential to manipulating material physical properties, ensuring retention of protein activity, and directing the interactions between the materials and cells. The strategies developed here provide opportunities to work with unlikely proteins, such as those from pathogenic bacteria, and transform them from disease causing agents into beneficial therapeutic materials. Protein design, self-assembly and disassembly properties, and applications of therapeutic protein materials in immunomodulation and cancer will be discussed.

*Refreshments will be available at 9:45 am.