BIOSS: Centre for Biological Signaling Studies
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Using Protein Engineering to Design Biomaterials for Tissue Regeneration

A key goal in designing biomaterials is to harness functionalities found in nature, creating materials that mimic critical components of the natural extracellular matrix (ECM). Our lab designs such materials as block-copolymer hydrogels composed of engineered proteins synthesized by bacterial hosts. Dictating the specific amino acid sequences of these designed proteins affords us molecular level control to incorporate biochemical and biomechanical elements of natural ECM. In addition, by altering the sequences of the designed proteins, the assembly mechanisms, mechanical properties, and cell-material interactions can be modulated. Given their cytocompatibility and bioactivity, these materials are ideal candidates for use as cell and drug delivery vehicles, implant coatings, and biomaterials for reconstructive surgeries.

This seminar will cover two examples of engineered hydrogels: (1) MITCH, a 3D physical hydrogel designed with thixotropic, shear-thinning and self-healing, properties to act as a injectable cell delivery vehicle and (2) an elastin-like, photocrosslinkable biomaterial developed for use as a cell-adhesive, thin film implant coating.