

Compatibility of formulations and materials in the medical field

Context

Proteins like insulin and antibodies are important therapeutics due to their interaction specificity. However, protein surface adsorption can cause aggregation, reducing therapeutic value. Understanding protein-surface interactions is key to producing and delivering effective biotherapeutics.

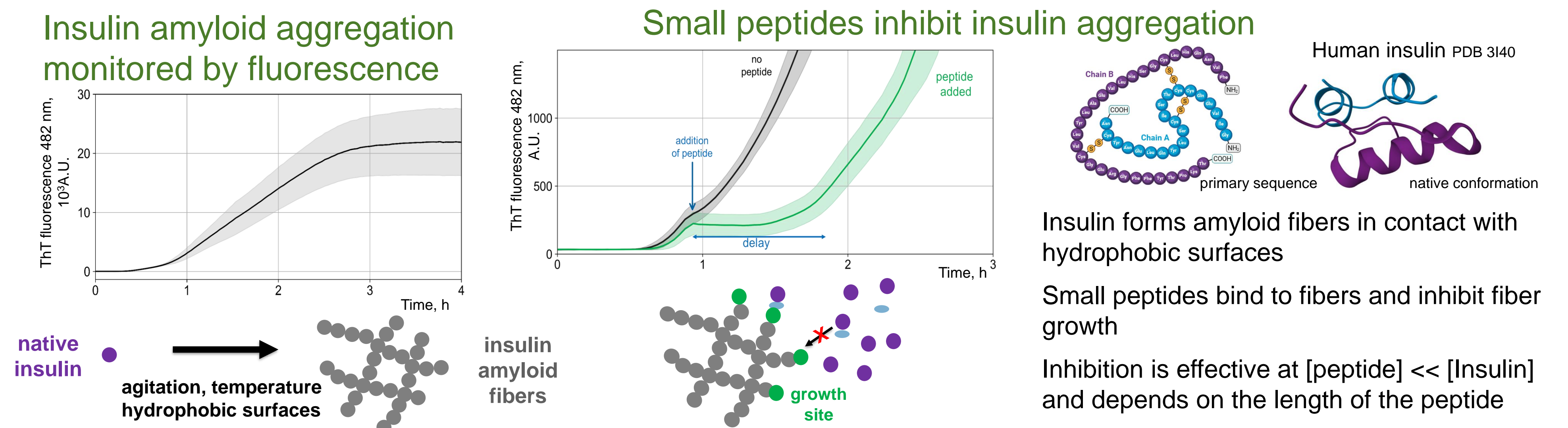
Objectives

Understand molecular interactions at surfaces by correlating material surface properties with therapeutic formulations. Collaborate with industry to develop improved diagnostic and therapeutic solutions.

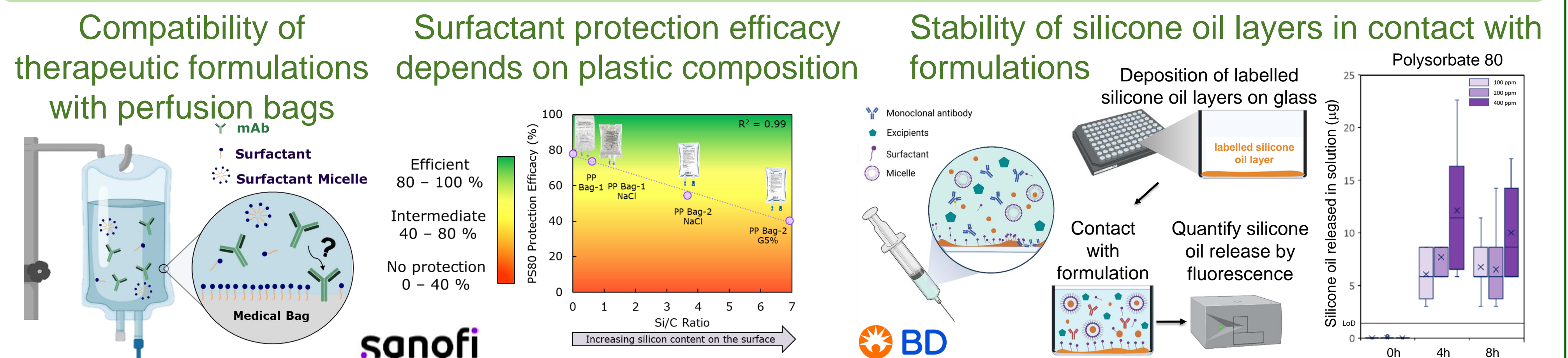
Skills and competences

We employ interface-sensitive techniques to investigate molecular adsorption processes and associated conformational dynamics. QCMd, SPRi, ATR FTIR, ELISA, Fluorescence spectroscopy and microscopy.

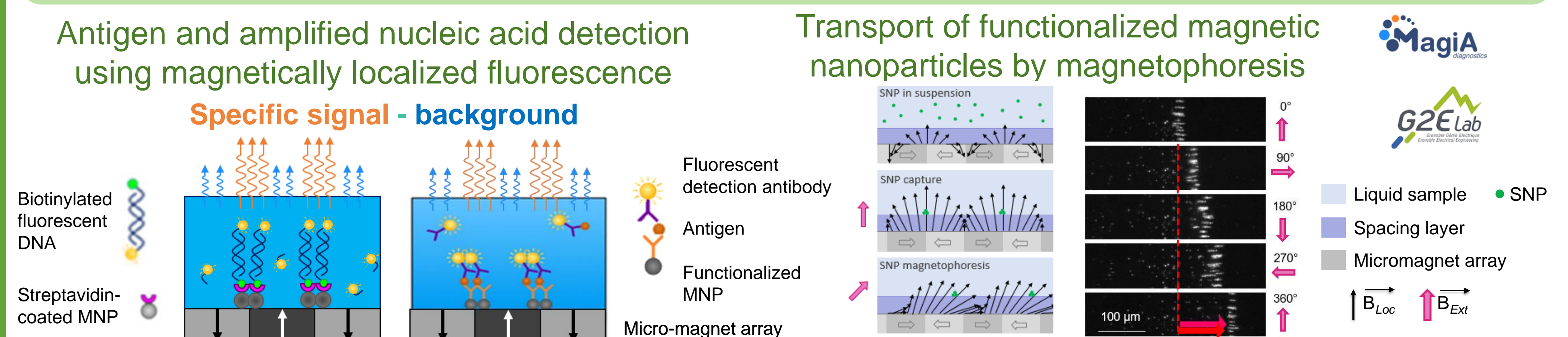
Surface-induced insulin amyloid aggregation



Therapeutic protein stability at interfaces



Development of innovative diagnostic tools



Protein-based natural adhesives

Context

Some natural adhesives produced by marine animals perform better than those manufactured by humans. Their adhesive function is based on their fibrillation and is influenced by the surface properties of the materials on which they stick.

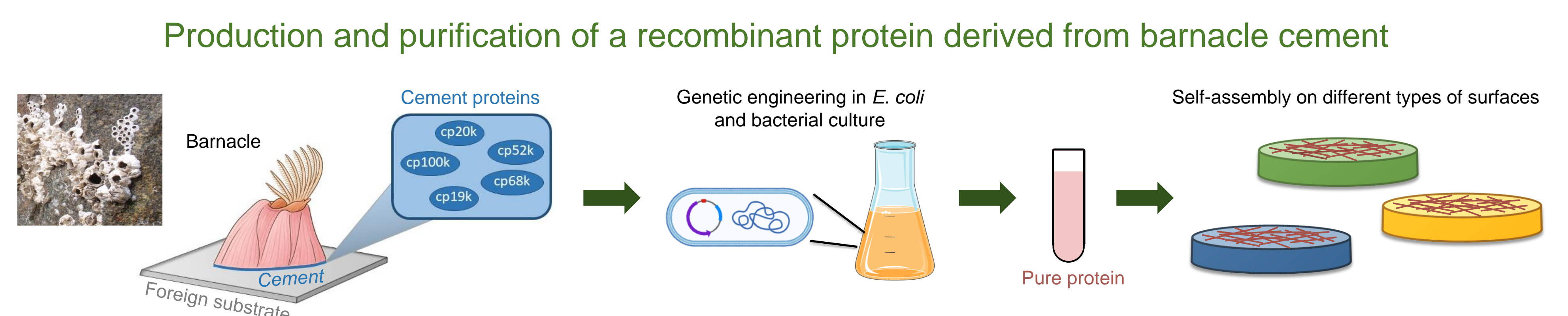
Objectives

Design bio-inspired adhesive proteins in order to study their structure-function relationships when in contact with material surfaces. Understand how the surface-dependent self-assembly of these proteins generates their adhesive properties.

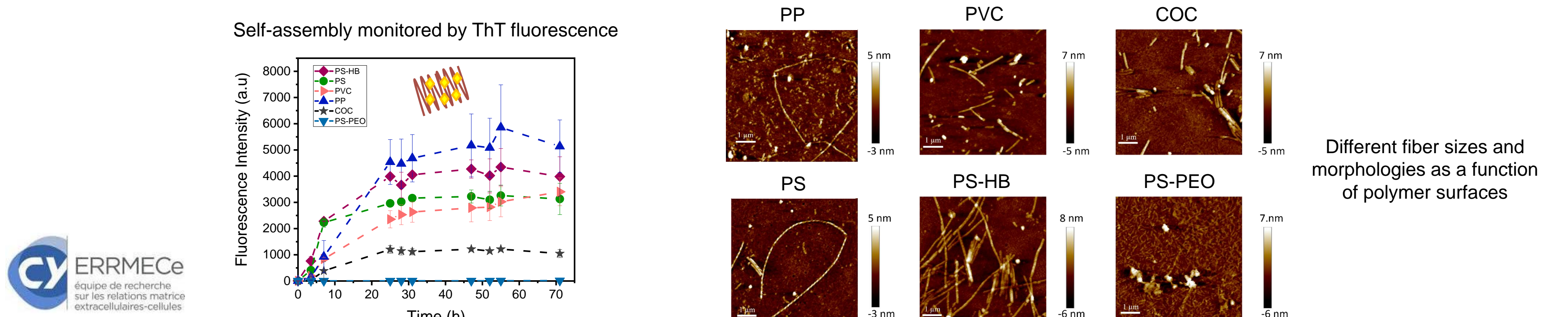
Skills and competences

We design, produce and purify recombinant proteins, and analyse their physico-chemical properties and functions by ELISA, fluorescence spectroscopy, SPRi, FTIR and AFM.

Self-assembly of a barnacle-inspired protein



Self-assembly on different polymers



Surface interactions of a barnacle-inspired protein

SPRi for real-time monitoring of protein adsorption on diverse SAM surfaces

