

Self-assembled Peptide Amphiphiles to Control Cellular Response

Opportunity

Self-assembly of biologically programmed peptide amphiphiles produces cylindrical micelles and fibers that are capable of stimulating cellular response (bone and nerve regeneration, wound healing).

Approach

Self-assembly can be achieved through pH or salt control of monomer aggregation, but not all peptide amphiphiles will lead to fibers. Also, the conditions needed for in vivo applications are not always compatible with self-assembly. Theoretical modeling provides important insight to the self-assembly, but the structures involved can be quite large.

Meso Challenge

Self-assembly needs to balance the need to produce fibers large enough to be useful for nerve or bone structures, while at the same time using peptide amphiphile components that have molecular-level biological function.

Impact

The Peptide Amphiphile fibers have already proven to be useful for bone and nerve repair. Applications to many other applications involving biological tissue repair are conceivable.

Hartgerink, J. D.; Beniash, E.; Stupp, S. I. *Science* **2001**, 294, 1684.
Lee, O.-S.; Stupp S. I.; Schatz, G. C., *J. Am. Chem. Soc.* 113, 3677-3683 (2011)