Biopolymer Research

Peptide Induced Self-Assembly of Collagen Proteins into Periodic Fiber

Jinyuan Hu
Rutgers University, NJ 08854, USA

Abstract:
The potential applications of recombinant bacterial collagen-like proteins are limited by lacking high order structures to form biomaterials. To improve the self-assembly ability of collagen-like proteins, we have designed collagen-like engineered proteins flanked by N- and C-terminal (PPG)10 sequences. Upon expression in E. coli, these designs self-assembled into axial D-periodic fibers with spacing matching the length of the bacterial collagen domain. Computational analysis of self-assembly has given insight into the mechanism behind the banded fiber morphology. The interactions between collagen designs and cultured fibroblasts are being studied to determine how fiber morphology affects cell structure and viability. This study provides a design strategy for the production of collagen proteins with functional sequences and tunable morphology for biomimetic materials in tissue engineering applications. The collagen proteins flanked by N- and C-terminal (PPG)10 sequence can be successfully expressed in E.coli and self-assembled into D-periodic fibers regardless of collagen-like domain. Through regulated the length of the collagen domain, we can change the length of D-periodicity.

Biography: Jinyuan is a visiting scholar from Jiangnan University and now doing research at Rutgers University. Jinyuan has her expertise in evaluation and passion in improving the collagen fibers.

Publications:
1. Boosting extracellular protein secretion of Escherichia coli via perturbing cell wall
2. Using a collagen heterotrimer to screen for cation-π interactions to stabilize triple helices
3. Improving extracellular protein secretion of Escherichia coli via deleting dacA and dacB to perturb cell wall
4. Stabilizing effects of pairwise salt bridges between acidic and basic residues in a collagen heterotrimer

World Congress on Polymer Materials, Webinar, September 28-29, 2020

Abstract Citation: Jinyuan, Peptide Induced Self-Assembly of Collagen Proteins into Periodic Fiber., Polymer Materials 2020, World Congress on Polymer Materials, Webinar , September 28-29,2020