Self-Assembled Peptides for Functional Nanomaterials

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Self-assembly is a process in which small building blocks spontaneoulsy form larger and ordered structures via weak interactions between them. In principle, we can fabricate various complex nano/microstructures from different materials through a rational desion of building blocks. Sometimes, however, designing of basic building blocks is most challenging. One efficient way to solve this problem is to mimic biological self-assembling systems, which have evolved over millions of years. In this presentation, we will focus on the self-assembly of amyloidogenic peptides and short aromatic dipeptides, which have implications in both medicine and materials science. By controlling processing conditions such as temperature ans chemical atmosphere, we could control the morphology and structure of nanomaterials self-assembled from peptide-based building blocks. In particular, we could grow vertically well-aligned peptide nanowires with an average diameter of 200 nm and a high aspect ratio of at least 100 by treating amorphous diphenylalanine thin film with aniline vapor at 100 ºC. In addition, some applications examples will be also suggested.