

Tissue engineering (TE) is a multidisciplinary field involving engineering, biochemistry and biomedicine. TE combines cells with scaffold materials and necessary growth factors to regenerate or replace damaged or degenerated tissue or organ. Since the last few decades the scientists are in the search of natural biopolymers made by living organisms that can be used as a scaffold for tissue formation. Amongst the variety of biomaterials tested, silk fibroin (SF) based scaffold is a promising biomaterial that is being used for bone, cartilage, ligament, tendon, skin regeneration. Silks are highly expressed protein polymer produced by silkworms during their pupal stage to protect the worm from the external environmental stress. The FDA approved silk fibroin (SF) is retaining its attention in biomedicine due to ease of its processing, excellent biocompatibility, mechanical properties and non-toxic degradability. Here we present application of the SF-based studies to understand the self-assembly of this protein and the development of advanced drug delivery devices based on SF hydrogel containing silk nanoparticles by controlling the self-assembling processes.