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Self-Assembled Supramolecular Systems for Bone Engineering ApplicationsPanpan Pan,^{a,#} Xiao Chen,^{a,#} Kamolrat Metavarayuth,^b Jiacan Su,^{a,*} Qian Wang^{b,*}

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Abstract

Bone regeneration is a complicated physiological process comprising of bone formation and resorption under the circumstances of some pathological conditions. This review highlights the recent development of self-assembled supramolecular systems, including spontaneous collagen-based scaffold, self-assembled peptide-based materials, modified cyclodextrin-based materials, and assembled protein or viral particles in bone regeneration applications. These self-assembled structures can offer two unique advantages for bone tissue engineering: (1) through rational design, highly ordered self-assembled supramolecular structures can be produced to display multiple functional units in a polyvalent manner; and (2) the reversible assembly-disassembly process renders the supramolecular assembly the responsiveness towards environmental or cellular stimuli. Thus, we envision that the self-assembled supramolecular materials provide promising options in clinical bone regeneration applications.

Keywords: *Self-assembly; Supramolecular materials; Osteogenic differentiation; Bone regeneration; Self-assembled peptides; Collagen; Growth factor delivery*

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