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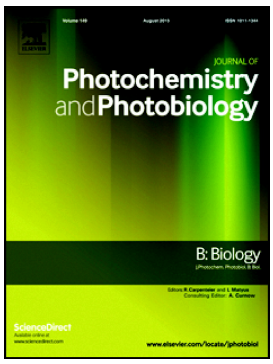

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Biocompatible nanocomposite of TiO_2 incorporated bi-polymer for articular cartilage tissue regeneration: A facile material

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Abstract

The development and design of polymeric hydrogels for articular cartilage tissue engineering have been a vital biomedical research for recent days. Organic/inorganic combined hydrogels with improved surface activity have shown potential for the repair and regeneration of hard tissues, but have not been broadly studied for articular cartilage tissue engineering applications. In this work, bi-polymeric hydrogel composite was designed with the incorporation some quantities of stick-like TiO_2 nanostructures for favorable surface behavior and enhancement of osteoblast adhesions. The microscopic investigations clearly exhibited that the stick-like TiO_2 nanostructured materials are highly inserted into the PVA/PVP bi-polymeric matrix, due to the long-chain PVA molecules are promoted to physical crosslinking density in hydrogel network. The results of improved surface topography of hydrogel matrixes show that more flatted cell morphologies and enhanced osteoblast attachment on the synthesized nanocomposites. The crystalline bone and stick-like TiO_2 nanocomposites significantly improved the bioactivity *via* lamellipodia and filopodia extension of osteoblast cells, due to its excellent intercellular connection and regulated cell responses. Consequently, these hydrogel has been enhanced the antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* bacterial pathogens. Hence it is concluded that