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Starch Incorporated Hydroxyapatite/Chitin Nanocomposite as a Novel Bone Construct

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Abstract : A nanocomposite system integrating hydroxyapatite, chitin and starch (n-HA/CT/ST) has been synthesized via co-precipitation approach at room temperature, addressing the issues of biocompatibility, mechanical strength and cytotoxicity required for Bone tissue engineering. The interactions, crystallite size and surface morphology against n-HA/CT (nano-hydroxyapatite/chitin) nanocomposite have been obtained by correlating and comparing the results of FTIR, SEM, TEM and XRD. The comparative study of the bioactivity of n-HA/CT and n-HA/CT/ST nanocomposites revealed that the incorporation of starch as templating agent improved these properties in n-HA/CT/ST nanocomposite. The rise in thermal stability in n-HA/CT/ST nanocomposite as compared to n-HA/CT has been observed by comparing the TGA results. The comparison of SEM images of both the scaffolds indicated that the addition of ST influenced the surface morphology of n-HA/CT scaffold which appeared to be rougher and porous. The MTT assay on murine fibroblast L929 cells and in-vitro bioactivity of n-HA/CT/ST matrix referred superior non-toxic property of n-HA/CT/ST nanocomposite and higher possibility of osteo-integration in-vivo, respectively.

Keywords : bioactive, chitin, hyroxyapatite, nanocomposite
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