

A Review on Biomimetic Hydroxyapatites for Biomedical Applications

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Abstract

This review provides an overview of characteristics on nano hydroxyapatite, HAP, with an emphasis on the improvement of its properties for biomedical applications, on the basis of our original research in the context of the state of the art. We consider the biological effects inspired by the role of HAP and physiological essential elements in the metabolism, development and regeneration of bone. The employment of multiple strategies to tackle the multi-substitution in the HAP lattice, resulting in multi-substituted hydroxyapatites, ms-HAPs, is likely to be accompanied by improvements of HAP properties as biomimetic hydroxyapatites for bone substitutes and dental cements for biomedical applications. The obtained nanostructured innovative biomaterials are briefly characterized by various physical and chemical methods. Due to the excellent capacity of HAP and ms-HAPs to adsorb various ions and biomolecules, like antimicrobial agents, they are major carriers for infection therapy. Also, we demonstrated that HAP is very efficient for the heavy metal removal from wastewater, such as industrial and mine water.

Keywords: hydroxyapatite, substituted hydroxyapatites, XRD, thermal treatment, morphological characterization.

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Introduction

Natural bone is the only tissue that can regenerate without the formation of any scar tissue due to osteoclasts, osteoblasts and osteocytes, which are important in bone function. Osteoclast cells absorb old bone lining the medullary cavity and osteoblasts, by intramembranous ossification, produce young bone tissue under the periosteum.