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## Simple preparation of hydroxyapatite nanostructures derived from fish scales

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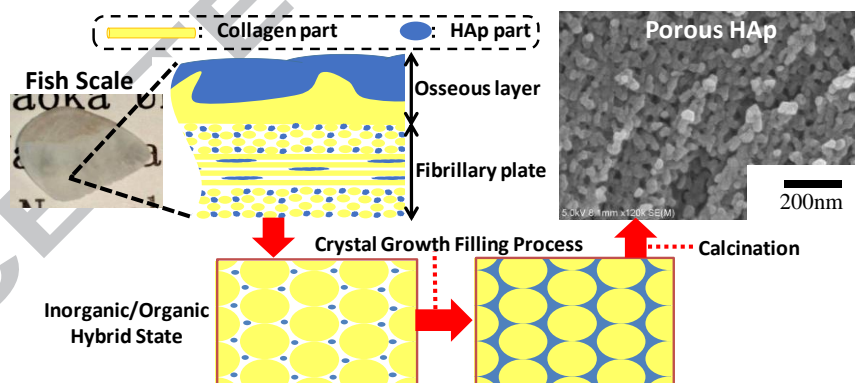
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**Abstract**

The nanostructured HAp formation in fish scales were investigated. Calcium and phosphate ions were effectively accumulated in the scales by the immersion processes. The HAp nanoparticles arranged in one direction in the internal fibrillary plate layers were observed, revealing the crystal growth along with the collagen fibers to resultantly form the porous structures. Thus, the arrangement of collagen fibers inside the scales effectively form the HAp nanostructures.

**Keywords**

Biomaterials, Bioceramics, Interfaces, Porous materials, Nanocomposites, Texture

**Graphical Abstract****1. Introduction**

Hydroxyapatite (HAp,  $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ ) has attracted attention because of their potential uses in biomedical fields [1, 2]. The biocompatible properties can be enhanced by the inorganic/organic hybrids [3, 4]. Accordingly, an important point is to investigate the HAp formation under the existence of functional organic molecules [5, 6]. The HAp forms gradually the charged *a*- and *c*-crystal planes on the organic groups at the nanoscales, and the resultant crystals can be controlled to

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