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Marine byproducts as source for functional and health-promoting biomaterials for tissue engineering applications

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Recently, the field of marine-derived biomaterials gained a considerable interest from researchers. Particularly, much attention has been devoted to the valorization of byproducts (e.g. shells, bones, etc.), exploring their potential for high added value compounds production. Many valuable products could be extracted from these wastes, including hydroxyapatite, collagen and calcium carbonate. To date, these compounds are produced by chemical reactions. Therefore, their extraction from marine waste biomass could be an effective way to reduce the disposal costs, which represent a big challenge for the manufacturers, by converting them into bioactive compounds and with commercial value. The aim of this study is to valorize fish waste and recover the mineral phases present, using simple thermal and/or chemical processes, to obtain biomaterials with specific biological features. Specifically, the mineral phase has been recovered by thermal treatment from fish bones, by testing different temperature, heating ramp and/or time. Starting from seashell, on the other hand, chemical conversion has been studied, by using mild conditions like avoiding strictly acid environment. With these processes, high purity Calcium Phosphates (CaP) powders can be produced, with good bioactivity features. The powders were fully characterized; in particular, features such as morphology, phase composition, surface area and bioactivity were tested. Some selected powders were successively used to fabricate 3D (Three-Dimensional) scaffolds.

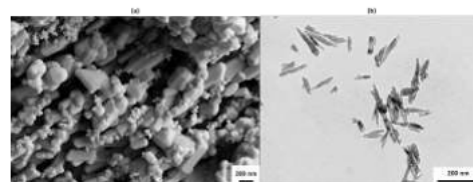


Figure 1: (a) SEM micrographs of hydroxyapatite from fish bone showing spherical nanocrystals with submicron average size (100-200 nm); (b) TEM micrograph of needle-shape calcium phosphate nanocrystals derived from shells with a length of about 60-100 nm.

Biography

Stefania Scialla is currently a Junior Post doctorate at the Institute of Nanotechnology, CNR of Lecce. She has completed her Master's degree in Molecular and Industrial Biotechnology at University of Federico II, Naples and PhD in Materials and Structures Engineering at the University of Salento, Lecce on Biomaterials for Tissue Engineering.

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