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Polycarboxy/Sulfo Betaine Functionalized Calcium Phosphates Obtained by Adsorption Process

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The adsorption of polycarboxy or polysulfo betaine on the double doped (with Zn and Mg) amorphous calcium phosphate (ACP) was studied with the aim of preparation of functionalized materials with improved remineralizing activity for dental applications. ACP is a precursor for the formation of the teeth and bone mineral phase. Mg and Zn are essential for the building and growth of hard tissues while polycarboxy (PCB) and polysulfo (PSB) betaines mimic the naturally occurring betaine form of amino acids as well as the polar groups of phospholipids.

The Mg (6.6 mol %) and Zn (1.2 mol %) doped calcium phosphates ($\Sigma Me^{2+}/P$ = 1.44 (Mg, Zn-ACP) were biomimeticaly prepared in the media of simulated body fluid and saturated solution of glycine that provides bone like composition and high specific surface area (100-180 m^2/g). The functionalized materials were prepared in dynamic conditions, PCB/PSB to Mg, Zn-ACP ratio of 1:10 g/g and solid to liquid ratio of 1:6.25 g/ml, 36°C and duration 6 and 24 hours.

It was established that the chosen method for obtaining the materials leads to the transformation of the initial amorphous calcium phosphate phase into poorly crystalline hydroxyapatite. This process occurs faster in the presence of PSB, with the amount of PSB in the final material being less than the amount of PCB. Under the conditions of the experiment, increasing the time from 6 to 24 h has no effect on the amount of adsorbed polymer.

Observed differences in the two materials can be explained by the different nature of the negatively charged functional groups of the polymers, which results in different polymer/calcium phosphate interactions.

Keywords: calcium phosphates, poly carboxybetaine, poly sulfobetaine

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