Synopsis of Original Research Paper

Processing of biocompatible apatite particles with well-controlled morphology and its application

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Hydroxyapatite ($Ca_{10}(PO_4)_6(OH)_2$; HAp) has been applied widely as a biomaterial for substituting human hard tissues and as an adsorbent for chromatography. The HAp crystal has two crystal planes with different charges: positive on *a*-planes and negative on *c*-planes. Thus, novel properties of the HAp may be produced by controlling the orientation of the crystal planes. Controlled orientation may be achieved by modifying the morphology of HAp crystals. For example, in order to increase the positive charge on the surface of the HAp fibres, it is possible to grow hexagonal-shaped HAp fibres which are oriented along the c-axis so that the *a*(*b*)-plane is wider than the *c*-plane. It is expected that these apatite fibres have high specificity of adsorption to acidic proteins with negative charges. One of the objectives of the present investigation was to establish the novel process for the syntheses of the HAp crystals with well-controlled morphology. We indicated the novel syntheses process of plate-shaped HAp crystals using amorphous calcium phosphate (ACP) as a starting material. This process contains the control of growth direction of ACP to HAp by the absorption of amino acids, and the accelerated crystal growth using an enzyme reaction of urea and urease. In particular, in the case using a glutamine acid as an amino acid, the plate-shaped HAp crystals were synthesized by hydrothermal treatment of the HEPES buffer including the Ca^{2+} and PO_4^{3-} ions, as well as urea and urease.