Synopsis of Original Research Paper

Preparation and Characterization of Calcium Hydroxyapatite Particles with UV Absorption Property From Forced Hydrolysis Reaction

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Ti and Ce ions doped calcium hydroxyapatite (TiHap and CeHap) particles were produced by aging $Ca(OH)_2$, $TiCl_4$ (or $CeCl_3$) and sodium triphosphate (sodium tripolyphosphate, Natpp: $Na_5P_3O_{10}$) mixed solution at 100°C for 18 h. The ellipsoidal secondary particles with ca. 100~150 nm in length composing by aggregation of small ellipsoidal primary particles with ca. 20 nm in length were produced at atomic ratio of Ti/(Ca+Ti) [X_{Ti}] $\leqq$ 0.2. The *in-situ* IR spectra of these TiHap particles exhibited very small bulk OH^- band at 3570 cm^{-1}. This result indicated that the TiHap particles were produced by aggregation mechanism and OH^- ions along with *c*-axis in the poorly crystallized primary particles were disordered. The diffuse reflectance UV spectra of TiHap particles revealed that these particles have a UV absorption property, especially produced at X_{Ti}=0.1. The morphology of the particles produced with $CeCl_3$ was changed to rod-like with ca. 50~100 nm in width and 100~300 nm in length at 0.1 $\leqq$ X_{Ce} $\leqq$ 0.2. Furthermore, particle shape varied to needle-like at 0.4 $\leqq$ X_{Ce} $\leqq$ 0.8 and finally fine spherical particles with 5~10 nm in diameter were precipitated at X_{Ce}=1.0. The XRD patterns of the particles indicated that highly crystallized pure CeHap particles are produced at X_{Ce} $\leqq$ 0.2. On the contrary, the needle-like and very fine spherical particles precipitated at X_{Ce}=0.4~1.0 were identified as $CePO_4$. The time resolved TEM and XRD measurements suggested that the rod-like large CeHap particles are produced by the Ostwald ripening mechanism. The diffuse reflectance UV measurement indicated that CeHap particles have a UV absorption property, especially produced at X_{Ce}=0.15.