Conversion of Marine Structures to Calcium Phosphate Materials: Mechanisms of Conversion Using Two Different Phosphate Solution

Abstract(s)

Marine structure, coralline materials were converted to calcium phosphate using two different phosphate solutions. The aim was to study the conversion mechanisms under acidic and basic environment at moderate conditions of temperature. Crystal growth and morphology of converted corals were characterized by XRD and SEM respectively. The results suggested that under acidic conditions (H_3PO_4), dissolution and precipitation control and direct the crystal formation and morphology in which transition from plate like to rod like hydroxyapatite structure was favoured. Metastable phase such as monetite formed and transformed to HAp during reaction. During the first hour of the dissolution a monetite and hydroxyapatite mixture precipitates and then the full conversion to hydroxyapatite is observed. On the other hand, under basic conditions $(NH_4)_2HPO_4$, just diffusional surface conversion of the calcium carbonate structure of coralline materials to hydroxyapatite and a very small amount of tri-calcium phosphate is observed. The mechanism can be classified as the solid-state topotactic ion-exchange reaction mechanism.

Keyword

Conversion, Coralline Topotactic, Ion-Exchange,Marine Structure, Phosphate, Solid State