

## **Synthesis of nanoporous carbonated hydroxyapatite using non-ionic pluronics surfactant**

### **Abstract**

Hydroxyapatite (HA) is a bioceramics that commonly used as bone substitute materials, coating materials and scaffolds in orthopedics. It is well known for its remarkable biocompatibility with natural human tissue. However, synthetic HA is different from biological apatite whereby apatites contain carbonate ion which is about 3-8wt% of the hard tissues of human body which described as carbonated hydroxyapatite (CHA). Hence, synthetic CHA may have a better bioactivity than HA and more widely used as biomaterials. This study described the synthesis and characterization of nanoporous carbonated hydroxyapatite (CHA) by co-precipitation method through self-organization mechanism with different type of non-ionic surfactants (P123 and F127). Diammonium hydrogen phosphate,  $(\text{NH}_4)_2\text{HPO}_4$  and calcium nitrate tetrahydrate,  $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$  were used as starting materials for preparing the precursor for CHA powder. The ammonium carbonate,  $\text{NH}_4\text{HCO}_3$  was used as the main source for carbonate ion. Synthesized powders were characterized using XRD, EDS, FESEM, TEM, and FTIR. From the XRD result, pure HA phase was obtained for all samples. FTIR analysis results obviously showed the substitution of carbonate ion into the apatite and confirm the formation of CHA. The FTIR results also demonstrated that the surfactants had been removed completely through calcination process. SEM image revealed a sphere-like particle shape of CHA was produced after the calcination. The mesoporous CHA with pore size 2-12 nm (F127) and 2-8 nm (P123) was synthesized.

### **Keywords**

Carbonated; Co-precipitation; Hydroxyapatite; Pluronic; Surfactant