

# Study of the Microstructural and Mechanical Properties of a Phosphocalcic Bone Substitute

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**Abstract :** The choice of calcium phosphate materials in reconstructive surgery is justified by the surprising similarities between the composition of these materials and that of the bone. Among a multitude of bone substitutes, hydroxyapatite of chemical composition  $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$  is the material most similar to natural apatites. In this study, hydroxyapatite was developed using the wet precipitation method from hydrated calcium chloride ( $\text{CaCl}_2 \cdot 12\text{H}_2\text{O}$ ) as a source of calcium and di-sodium hydrogen phosphate dihydrate ( $\text{HNa}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$ ) as a source of phosphate. Vickers Microhardness tests and XRD analyzes were used for the characterization of the synthesized material. The mechanical properties namely HV,  $\sigma_e$ , and  $\sigma_r$ , KIC and microstructural like crystallite size  $D_{hkl}$  and degree of crystallinity  $X_c$  were discussed according to the temperatures of the heat treatments. Two temperatures were chosen 900 and 1200°C. From the results obtained, it is obvious that the variation of the different properties studied correlates with the temperature of the heat treatment.

**Keywords :** Phosphocalcic ceramic, hydroxyapatite, Wet precipitation, hardness, Toughness, Crystallinity