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# Investigation of microstructure and mechanical properties of phosphocalcic bonesubstitute using the chemical wet method

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**Abstract:** Selection of calcium phosphate base materials in reconstructive bone surgery is justified by the surprising similarities in chemical compositions with human bones. The closest to natural apatite material is the hydroxyapatite (HAp) which has a chemical composition based on calcium and pho sphate (Ca 10 (PO 4 )6 (OH)2 ). In this study, HAp is synthesized using the wet precipitation method from hydrated calcium chloride (CaCl 2 ,12H 2 O) and di-sodium hydrogen phosphate di-hydrate (HNa 2 PO4,2H 2 O). The powder is calcinated at 900°C and 1200°C in order to compare with sintered condition at 1150°C. Vickers microhardness tests and X-ray diffraction analyzes are used for the characterization of the crystalline material. Mechanical properties ( HV , ?e, ? r , and K C ) and the degree of crystallinity (X c) are discussed according to heat treatment temperatures. Results indicate that heat trea ting the powder at 1200°C increased crystallinity up to 72%. At the same time, microhardness increased with temperature and even outmatched the sintered case at 1150°C. Fracture toughness is ameliorated with increasing heat treatment tempera ture by more than two folds.

**Keywords :** Biomaterials, hydroxyapatite, chemical wet method, mechanical properties, heat treatment