

## ABSTRAK

Hidroksiapatit ( $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ , HA) adalah bahan biokeramik yang banyak digunakan dalam aplikasi biomedis. Penelitian ini membandingkan pengaruh teknik sintering konvensional dan *two-step sintering* terhadap densifikasi dan sifat mekanik HA. Serbuk HA dibentuk menjadi pellet dan disintering konvensional pada 800, 900, 1000, dan 1100°C selama 2 jam, serta dengan *two-step sintering* pada 1000°C - 800°C dan 1000°C - 900°C masing-masing selama 2 dan 5 jam. Densitas, kekuatan mekanik (*Vickers Microhardness*), *XRD*, dan struktur mikro (*Raman Microscope*) diuji. Teknik *two-step sintering* meningkatkan densitas dari 2,5231 g/cm<sup>3</sup> menjadi 2,8378 g/cm<sup>3</sup> dan kekerasan dari 86,87 kg/mm<sup>2</sup> menjadi 102,913 kg/mm<sup>2</sup> pada temperatur tahan 800°C. *XRD* menunjukkan fasa HA dengan sedikit pengotor  $\beta$ -TCP. Teknik *two-step sintering* menghasilkan butir HA yang lebih halus dan homogen, menunjukkan peningkatan sifat mekanik dan mikrostruktur HA dibandingkan teknik sintering konvensional.

**Kata Kunci :** Hidroksiapatit, Sintering, Densitas, Uji Kekerasan, Struktur Mikro

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## ***ANALYSIS THE EFFECT OF SINTERING TECHNIQUES ON DENSIFICATION OF HYDROXYAPATITE AND MECHANICAL PROPERTIES***

### ***ABSTRACT***

*Hydroxyapatite ( $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ , HA) is a bioceramic material used in biomedical applications. This study compares the effects of conventional sintering and two-step sintering techniques on the densification and mechanical properties of HA. HA powder was formed into pellets and sintered conventionally at 800, 900, 1000, and 1100°C for 2 hours, as well as using two-step sintering at 1000°C - 800°C and 1000°C - 900°C for 2 and 5 hours, respectively. Density, mechanical strength (Vickers Microhardness), XRD, and microstructure (Raman Microscope) were tested. The two-step sintering technique increased the density from 2.5231 g/cm<sup>3</sup> to 2.8378 g/cm<sup>3</sup> and hardness from 86.87 kg/mm<sup>2</sup> to 102.913 kg/mm<sup>2</sup> at a holding temperature of 800°C. XRD showed the HA phase with slight  $\beta$ -TCP impurities. The two-step sintering technique produced finer and more homogeneous HA grains, indicating improved mechanical properties and microstructure of HA compared to conventional sintering techniques.*

**Keywords :** Hydroxyapatite, Sintering, Density, Hardness Test, Microstructure

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