

Structural Comparison of Natural and Synthetic Nanocrystalline Hydroxyapatite

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Abstract

Background: Hydroxyapatite is the main mineral component of bones. Due to its high biocompatibility, it is widely used in the treatment of bone lesions or production of dental or orthopedic implants. Biological behavior of hydroxyapatite depends on many factors such as chemical composition and phase, microstructure, size, and porosity volume. On the other hand, other hydroxyapatite nanocrystals have received increased attention due to their improved bio-efficiency including connectivity and formation of new bones on their surface.

Methods: In this research, nanocrystalline hydroxyapatite powder was synthesized by thermal synthesis or mechanochemical methods. The structures of the two types were then compared.

Findings: Products obtained from both processes was single-phase hydroxyapatite. No other stable phases were detected. Degrees of crystalline of the products of thermal synthesis and mechanochemical methods were 92.86% and 6.72%, respectively. Most particles had quasi-spherical morphology. In addition, particle sizes of products of heating and mechanochemical methods were 85 and 58 nm, respectively.

Conclusion: Phase analysis showed that the product of both processes was single-phase hydroxyapatite. On the other hand, all characteristic peaks were present in the product and it had high purity.

Keywords: Thermal synthesis, Mechanochemical, Nanostructure, Hydroxyapatite

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