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Journal of Mechanical Engineering
Volume SI 4, Issue 5, 1 December 2017, Pages 209-216

Physicochemical characteristics of magnesium hydroxyapatite (MgHA) derived via wet precipitation method (Article)

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Abstract

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Hydroxyapatite (HA) has been known for so many decades as an implant material for medical applications due to its chemical composition that is very similar to the inorganic component of human bone. However, synthetic HA possesses relatively low mechanical strength characteristic, making it less suitable to be used in load bearing applications. Thus, the presence of metal ion like magnesium (Mg) is expected to improve the properties of synthetic HA as biomedical devices. The main objective of this research is to develop and characterize the magnesium hydroxyapatite (MgHA) nanopowders derived from the wet precipitation method. The amount of Mg, which acts as a metallic dopant in HA were varied at 0, 5 and 10% and calcined at 700?C for imperative comparison. The resultant nanopowders were then characterized using thermogravimetric analysis (TGA), X-ray diffraction (XRD) and field-emission scanning electron microscopy (FESEM) to examine their physicochemical properties. Morphological evaluation by FESEM showed that the particle size of 10% MgHA powders was larger and spherical in shape but still highly agglomerated at calcination temperature of 700?C. This result coincides with the data obtained from the XRD analysis, which revealed that the particle size of pure HA, 5 and 10% MgHA after calcination was 87 nm, 98 nm and 116 nm, respectively. These results demonstrate that doping Mg into HA has caused an increase in the particle size, proving that Mg acts as a sintering additive during the calcination process. © 2016 Faculty of Mechanical Engineering.

Author keywords

Bio-implant material Hydroxyapatite Magnesium Physicochemical properties Wet precipitation method

ISSN: 18235514
Source Type: Journal
Original language: English
Document Type: Article
Publisher: UiTM Press

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