

Preparation and characterization of deer velvet antler/polyvinyl alcohol (DVA/PVA) scaffold for bone tissue engineering

Hamid, Hazrulrizawati Abd Anuar; Muhamad Zubair Ammar Khairul; Zulkifli, Farah Hanani

^a Faculty of Industrial Sciences and Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak, Pahang, Gambang, Kuantan, 26300, Malaysia

ABSTRACT

Combining synthetic polymer with inorganic bioactive elements has been an exciting route for developing tissue engineering scaffolds, in particular for bone tissue regeneration. In this study we report the fabrication of novel porous scaffold composed of polyvinyl alcohol/ deer velvet antler (DVA/PVA) via freeze-drying technique. The mineral content of deer velvet antler analyzed by ICPMS showed high content of calcium and phosphorus. Morphological observation revealed that the incorporation of DVA in the polymer matrix with the porous structures ranging from 35 to 100 μm . The FTIR demonstrated chemical interaction between DVA and PVA due to the reaction between calcium ions with hydroxyl. Thermal analysis showed significant temperature increase from 146.34°C to 384.48°C due to the degradation of the side chain of PVA and decomposition of the carbonate ions. The swelling behavior, the porosity, and the degradation rate of the DVA/PVA scaffold were meet the physiological demands of bone regeneration. After 7 days, DVA/PVA scaffold showed the increasing of water absorption and low degradation rate. Thus, the developed scaffold is believed to have a potential to be effectively used in bone tissue engineering applications.

KEYWORDS

Biocompatibility; Bone tissue engineering; Deer velvet antler (DVA); Polyvinyl alcohol (PVA); Porous scaffold

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