Titania-Hydroxyapatite Bioceramics

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ABSTRACT

Sol-gel titania (TiO_2) and sol-gel titania-hydroxyapatite (TiO_2-HA) have been found to be bioactive. The bioactivity has been related to the low temperature titania phase –anatase. However, sol-gel method is known to be limited to powder synthesis and coating application. This study aimed to investigate the microstructural development and bioactivity of bulk TiO_2-HA composites prepared by a sol-gel method. In the study, commercial HA powder was mixed with sol-gel TiO_2 powder derived from titanium butoxide via the reaction with water, followed by pressing and sintering in air at different temperatures (600 ^oC – 1200 ^oC). The samples obtained were studied using x-ray diffraction (XRD), scanning electron microscopy (SEM), and immersion test in the simulated body fluid (SBF). It was found that the rutile phase of titania after sintering at 900 ^oC was bioactive, indicated by the apatite layer formation in the SBF. Titania-40vol% hydroxyapatite composites could be densified at 1200 ^oC. The anatase to rutile phase transition temperature was shifted to a higher temperature (i.e. 900 ^oC rather than 600 ^oC) due to the HA addition. The composite sintered at 900 ^oC was also found to be bioactive. This preliminary study indicated that the bulk TiO_2/HA composites are potential and deserve further study.

Keywords: Titania, HA, sol-gel, composite and bioactivity

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