

Morphological and optical properties of porous hydroxyapatite/cornstarch (HAp/Cs) composites

ABSTRACT

This paper presents the correlation between the morphological characteristics and the diffuse reflectance (optical properties) of the porous hydroxyapatite/cornstarch (HAp/Cs) composites with various starch proportions (30, 40, 50, 60, 70, 80 and 90 wt%). The porous composites were measured via SEM and enhanced by image processing to find the average pore size, strut width, and average surface roughness. The average porosity of the porous composites was measured using liquid displacement method. The diffuse reflectance spectroscopy was implemented to investigate the diffuse reflectance and the corresponding optical band gap energy of the porous composites in the 500–900 nm range. A relationship between morphological characteristics and diffuse reflectance properties were established using Pearson's correlation coefficient. The findings of the study depict that a strong correlation can be noticed between optical band gap energy with porosity, pore sizes and surface roughness of the porous composites. Meanwhile, the strong correlations between the diffuse reflectance spectral gradient with surface roughness can be observed. The moderate correlations can be observed between the diffuse reflectance spectral gradient with pore sizes and strut width of the porous composites.

Keyword: Diffuse reflectance; Morphology; Porous composite; Hydroxyapatite; Cornstarch