

Preparation and Characterizations of Hydroxyapatite-Sodium Alginate Nanocomposites for Biomedical Applications

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Abstract : Polymer-inorganic nanocomposites are presently impacting diverse areas, specifically in biomedical sciences. In this research, hydroxyapatite-sodium alginate has been prepared, and characterized, with emphasis on the influence of sodium alginate on its characteristics. In situ wet chemical precipitation method was used in the preparation. The prepared nanocomposite was characterized with Fourier Transform Infrared spectroscopy (FTIR), Scanning Electron Microscopy (SEM), with image analysis, and X-Ray Diffraction (XRD). The FTIR study shows peaks characteristics of hydroxyapatite and confirmed formation of the nanocomposite via chemical interaction between sodium alginate and hydroxyapatite. Image analysis shows the nanocomposites to be of irregular morphologies which did not show significant change with increasing sodium alginate addition, while particle size decreased with increase in sodium alginate addition (359.46 nm to 109.98 nm). From the XRD data, both the crystallite size and degree of crystallinity also decreased with increasing sodium alginate composition (32.36 nm to 9.47 nm and 72.87% to 1.82% respectively), while the specific surface area and microstrain increased with increasing sodium alginate composition (0.0041 to 0.0139 and 58.99 m²/g to 201.58 m²/g respectively). The results show that the formulation with 50%wt of sodium alginate (HASA-50%wt), possess exceptional characteristics for biomedical applications such as drug delivery.

Keywords : nanocomposite, sodium alginate, hydroxyapatite, biomedical, FTIR, XRD, SEM

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