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Biodegradation and bioresorption of poly(E-caprolactone)nanocomposite scaffolds

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Abstract

A new type of hybrid three-dimensional scaffolds was prepared using poly(caprolactone) (PCL) and chitosan-modified montmorillonite by solvent casting and particulate leaching method. The scaffolds were characterized by scanning electron microscopy coupled with energy dispersive spectroscopy (EDS), X-ray diffraction (XRD), and dynamic mechanical analysis to study the structural and mechanical properties. The resulting scaffolds displayed high porosity with highly interconnected pores. EDS analysis confirmed the elemental composition of the scaffolds. The phase composition of the scaffolds was shown by XRD, which also indicated a decrease in crystallinity with the introduction of nanoclay. Biodegradability studies which were conducted in simulated physiological conditions over a period of four weeks revealed that the PCL-based scaffolds degraded by hydrolysis at a slow rate. The overall bioresorbability was also slow, with the composite-based scaffolds recording a faster rate than the neat polymer-based scaffold.