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M.A. Gámiz-González, A. Vidaurre, J.L. Gómez Ribelles

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Biodegradable chitosan-poly(Ɛ-caprolactone) dialdehyde copolymer networks for soft tissue engineering.

1.1 **M. A. Gámiz-González [a], A. Vidaurre [a,b] and J. L. Gómez Ribelles[a,b].**

[a] Center for Biomaterials and Tissue Engineering (CBIT), Universitat Politècnica de València, Cno. de Vera s/n, 46022 Valencia, Spain.
[b] Networking Research Center on Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN), Valencia, Spain

Abstract

Chitosan/PCL block-copolymer networks were synthesized using different amounts of aldehyde end-capped polycaprolactone as crosslinking agent. The crosslinking reaction was performed by dissolving both components in the common solvent hexafluoroisopropanol (HFIP). The formation of the network was confirmed by solubility tests in good solvents of both components. The resulting composition was determined by thermogravimetric analysis. The hydrophilic/hydrophobic networks behave as hydrogels; water sorption at pH7 is around 70% that of pure chitosan for a network containing 36% PCL blocks. The PCL domains were not able to crystallize, except for the CHT-64 sample as shown by DSC and X-ray diffraction. Enzymatic degradation of these networks is quite fast, thus, the network with 36% PCL presented a remaining weight of 22 ± 1% of their initial mass after 28 days of degradation in lipase. Nevertheless in purely hydrolytic degradation, the remaining weight was 86 ± 3% for the same time and composition.

Highlights

Chitosan hydrogel was obtained using a biodegradable PCL based cross-linker.

The obtained chitosan hydrogel was a phase-separated block copolymer network.

The swelling capacity of the networks was similar to that of pure CHT.