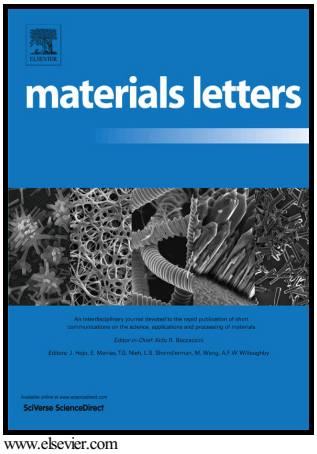

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Hydrolytic and lysozymic degradability of chitosan systems with heparin-mimicking pendant groups

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Abstract

Chitosan (CT) is an antibacterial polysaccharide that has been investigated for drug carriers, haemostats and wound dressings. For these applications, customised CT devices can often be obtained with specific experimental conditions, which can irreversibly alter native biopolymer properties and functions and lead to unreliable material behaviour. In order to investigate the structure-function relationships in CT covalent networks, monosodium 5-sulfoisophthalate (PhS) was selected as heparin-mimicking, growth factor-binding crosslinking segment, whilst 1,4-phenylenediacetic acid (4Ph) and poly(ethylene glycol) bis(carboxymethyl) ether (PEG) were employed as sulfonic acid-free diacids of low and high crosslinker length respectively. Hydrogels based on short crosslinkers (PhS and 4Ph) displayed increased crosslink density, decreased swelling ratio as well as minimal hydrolytic and lysozymic degradation, whilst addition of lysozymes to PEG-based networks resulted in 70 wt.-% mass loss. PhS-crosslinked CT hydrogels displayed the highest loss (40 ± 6 CFU%) of antibacterial activity upon incubation with *Porphyromonas gingivalis*, whilst respective extracts were tolerated by L929 mouse fibroblasts.

Graphical abstract