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PEG-based nanocomposite hydrogel: Thermo-responsive sol-gel transition and degradation behavior controlled by the LA/GA ratio of PLGA-PEG-PLGA

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Abstract:

The sol-gel transition behavior and the degradation behavior of the nanocomposites consisting of laponite clay nanoparticles and poly(D,L-lactide-*co*-glycolide)-*b*-poly(ethylene glycol)-*b*-poly(D,L-lactide-*co*-glycolide) (PLGA-PEG-PLGA) triblock copolymers (laponite/PLGA-PEG-PLGA nanocomposites) were studied changing the LA/GA ratios of the PLGA blocks in the PLGA-PEG-PLGA. The thermo-responsive sol-gel transition at the physiological temperature (25–37°C) was observed using the PLGA-PEG-PLGA with a high PEG/PLGA ratio of ~0.8 regardless of the LA/GA ratios (LA/GA: 1.1, 4.0, and 8.8). The decomposition rates of the laponite/PLGA-PEG-PLGA nanocomposites at 37°C were regulated by adjusting the LA/GA ratios (LA/GA: 1.1, 4.0, and 8.8). Specifically, ~45% of the weight loss was observed after 10 days of the decomposition for the laponite/PLGA-PEG-PLGA nanocomposites with the LA/GA ratio of 1.1, while ~30% of the weight loss was observed after 10 days of the decomposition for the laponite/PLGA-PEG-PLGA nanocomposites with the LA/GA ratios of 4.0 and 8.8.

Keywords:

PLGA-PEG-PLGA; Nanocomposite; Thermo-responsive hydrogel; Biodegradable