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Abstract
In this study, thermosensitive hydrogels to be used as artificial wound dressings were prepared by polymerization at room temperature and polymerization via γ-ray irradiation, respectively. P(N-isopropyl acrylamide) (PNIPAAm) hydrogel and its copolymer with acrylic acid (AAc), (P(NIPAAm-co-AAc) hydrogels were prepared. The low critical solution temperature (LCST), swelling, and mechanical properties of these hydrogels were determined and their swelling-deswelling kinetics and drug controlled release behavior were investigated. The results indicate that copolymerization of AAc with NIPAAm raised the LCST and degree of swelling of PNIPAAm hydrogels, especially in the case of polymerization via γ-ray irradiation. In both preparation methods, the incorporation of nano-clay into the hydrogels inhibited the degree of swelling, suggesting nano-clay played a role as a cross-linking agent inside the hydrogels. In drug controlled release studies, vancomycin was effectively sustained release from nano-clay incorporated hydrogels in both methods. The ability of sustained release of vancomycin increased with increasing the concentration of incorporated nano-clay, especially for γ-ray irradiated PNIPAAm hydrogels. The release of vancomycin from P(NIPAAm-co-AAc) hydrogels was faster than that from PNIPAAm hydrogels in both methods. Finally, hydrogels were grafted onto porous PU substrate by γ-ray irradiation. Hydrogels were successfully grafted onto PU substrate with 26~32 % grafting efficiency in the dosage between 15~35 kGy.
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