

Synthesis and characterization of stimuli-sensitive and mucoadhesive polymer hydrogels

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Novel gelatin-containing polymer hydrogels that can be used as mucoadhesive delivery systems were developed. Poly(acrylic acid) hydrogels were modified by copolymerizing gelatin as adhesion promoter, to improve the adhesion to the mucus layer. The pH-sensitivity and the mucoadhesive property of the P(AA-co-GelMA) hydrogel were investigated as carries of an oral protein delivery system activated by pH changes of the human GI tract. There was a drastic change in the weight swelling ratio of P(AA-co-GelMA) hydrogels at a pH of around 5. In addition, the swelling ratio increased at a pH above 5, when the AA content in the hydrogel increased. In mucoadhesive experiments using the rheometer, when the GelMA concentration in the P(AA-co-GelMA) hydrogel increased, the maximum force of detachment increased, indicating that the mucoadhesion of the hydrogel were improved. The P(AA-co-GelMA) hydrogels also showed a pH-responsive release behavior. The ratio of the cumulative amounts of Rh-B released from P(AA-co-GelMA) hydrogels at pH 2.6 to pH 7.0 increased, when the AA content in the hydrogel decreased.