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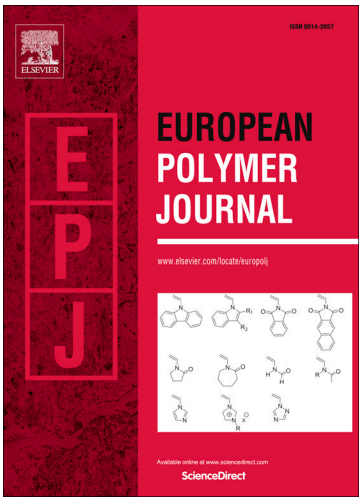

pH-responsive chitosan/alginate polyelectrolyte complex membranes reinforced by tripolyphosphate

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pH-responsive chitosan/alginate polyelectrolyte complex membranes reinforced by tripolyphosphate

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Abstract

pH-sensitive chitosan/alginate/tripolyphosphate (Ch/Alg/TPP) hydrogel membranes based on chitosan/alginate (Ch/Alg) polyelectrolyte complex and crosslinking agent tripolyphosphate (TPP) were synthesized. An effect of TPP-crosslinking on the molecular structure, crystallinity, morphology, swelling and model drug release behavior of the Ch/Alg membrane was analysed. The dynamic swelling behavior of the Ch/Alg and Ch/Alg/TPP membranes were studied in solutions of different pH (1.0-9.0). At pH 7.4 or higher Ch/Alg and Ch/Alg/TPP hydrogels showed an untypical swelling behavior, i.e. "overshooting effect". The results showed, that addition of TPP reinforced chitosan/alginate network. The swelling/deswelling behavior of the membranes was investigated at pH=1.5 (or 3.5) and 9 to confirm the response rate and reversibility of the swelling process. Ch/Alg/TPP membranes exhibited sharp swelling/deswelling behavior and high stability in acidic and basic solutions what makes them suitable candidate for drug delivery systems. Drug release of ascorbic acid from Ch/Alg/TPP membrane was measured in buffer solutions of pH=3.5 and 7.4.

Highlights:

- Tripolyphosphate (TPP) was applied to reinforce Ch/Alg membranes.
- TPP-crosslinking affected the structure and properties of Ch/Alg membranes.
- Dynamic swelling curves of Ch/Alg/TPP membranes exhibited an overshooting effect at pH≥7.4.
- Ch/Alg/TPP membranes had good swelling/deswelling ability and pH-sensitivity.
- Ch/Alg/TPP membranes seem to be suitable candidate for drug delivery systems.