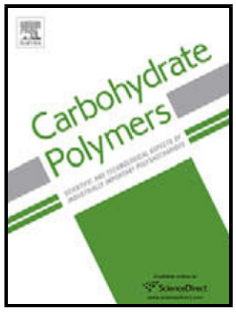

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PII: S0144-8617(17)30533-7
DOI: http://dx.doi.org/doi:10.1016/j.carbpol.2017.05.026
Reference: CARP 12312

To appear in:

Received date: 27-10-2016
Revised date: 16-4-2017
Accepted date: 7-5-2017

Please cite this article as: Sun, Nan., Wang, Ting., & Yan, Xiufeng., Self-assembled supermolecular hydrogel based on hydroxyethyl cellulose: formation, in vitro release and bacteriostasis application.*Carbohydrate Polymers* http://dx.doi.org/10.1016/j.carbpol.2017.05.026

Self-assembled supermolecular hydrogel based on hydroxyethyl cellulose: formation, in *vitro* release and bacteriostasis application

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Highlights

1. A novel hydroxyethyl cellulose based, self-assembled hydrogel was synthesized.
2. The loading and in *vitro* release of EG from gel-(*β*)CDP-HEC were investigated.
3. Gel-(*β*)CDP-HEC/EG demonstrated potential advantages as bacteriostasis materials.

Abstract

Self-assembly of cellulose-based hydrogel is a new supermolecular architecture with potential for biomedical applications. In this study, a novel cellulose-based, supermolecular self-assembled hydrogel (gel-(*β*)CDP-HEC) was studied, which was based on the host-guest interaction between hydrophobic lauryl side chains grafting on hydroxyethyl cellulose (HEC-C_{12}) and the cavities in poly(*β*-cyclodextrin) (*β*-CDP). The critical concentrations of HEC-C_{12} and *β*-CDP should be both fixed at 30 mg mL^{-1} by the results of dynamic viscosity, rheological property and swelling ratio. Fourier Transform Infrared Spectroscopy (FTIR), ^{1}H-Nuclear Magnetic Resonance (^{1}H NMR), Scanning Electron Microscope (SEM) and Gel Permeation Chromatography (GPC) studies were used to characterize the synthesized samples. Furthermore, the encapsulation capacity of gel-(*β*)CDP-HEC was determined as 21.89wt% by phenolphthalein probe method. The loading and in *vitro* release of Eugenol (EG) were investigated. Thermogravimetric Analysis (TGA) was used to characterize the thermal stability of the EG-loaded gel-(*β*)CDP-HEC (gel-(*β*)CDP-HEC/EG). The bacteriostasis characteristics against *Escherichia coli* had been proved by agar cup-plate diffusion method. The results demonstrated that gel-(*β*)CDP-HEC had a potential advantage as efficient bacteriostasis materials for biomedical applications.

Keywords: Self-assembled hydrogels. Cyclodextrins. Hydroxyethyl cellulose. Eugenol