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Authors: Nan Sun, Ting Wang, Xiufeng Yan



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

Nan Sun <sup>[a]</sup>, Ting Wang\* <sup>[a,b]</sup>, Xiufeng Yan <sup>[b]</sup>

*a.* Department of Chemistry, College of Science, Northeast Forestry University, Harbin 150040, P. R. China

*b.* Alkali Soil Natural Environmental Science Center, Northeast Forestry University; Key Laboratory of Saline-alkali Vegetation Ecology Restoration in Oil Field, Ministry of Education, Harbin 150040, P. R. China

\*Correspondence to Ting Wang: E-mail: thundersking@aliyun.com

Telephone: +86 0451 8219 2248

Fax: +86 0451 8219 2248

### Highlights

1. A novel hydroxyethyl cellulose based, self-assembled hydrogel was synthesized.
2. The loading and *in vitro* release of EG from gel-( $\beta$ )CDP-HEC were investigated.
3. Gel-( $\beta$ )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-( $\beta$ )CDP-HEC) was studied, which was based on the host-guest interaction between hydrophobic lauryl side chains grafting on hydroxyethyl cellulose (HEC-C<sub>12</sub>) and the cavities in poly( $\beta$ -cyclodextrin) ( $\beta$ -CDP). The critical concentrations of HEC-C<sub>12</sub> and  $\beta$ -CDP should be both fixed at 30 mg mL<sup>-1</sup> by the results of dynamic viscosity, rheological property and swelling ratio. Fourier Transform Infrared Spectroscopy (FTIR), <sup>1</sup>H-Nuclear Magnetic Resonance (<sup>1</sup>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-( $\beta$ )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-( $\beta$ )CDP-HEC (gel-( $\beta$ )CDP-HEC/EG). The bacteriostasis characteristics against *Escherichia coli* had been proved by agar cup-plate diffusion method. The results demonstrated that gel-( $\beta$ )CDP-HEC had a potential advantage as efficient bacteriostasis materials for biomedical applications.

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

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