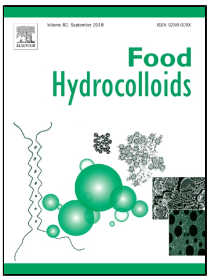
# Accepted Manuscript




Rheological behaviors and physical properties of plasticized hydrogel films developed from κ-carrageenan incorporating hydroxypropyl methylcellulose

Guohou Sun, Tieqiang Liang, Wenying Tan, Lijuan Wang

| | |
|---|---|
| PII: | S0268-005X(18)30907-X |
| DOI: | 10.1016/j.foodhyd.2018.07.002 |
| Reference: | FOOHYD 4531 |
| To appear in: | *Food Hydrocolloids* |
| Received Date: | 19 May 2018 |
| Accepted Date: | 02 July 2018 |

Please cite this article as: Guohou Sun, Tieqiang Liang, Wenying Tan, Lijuan Wang, Rheological behaviors and physical properties of plasticized hydrogel films developed from κ-carrageenan incorporating hydroxypropyl methylcellulose, *Food Hydrocolloids* (2018), doi: 10.1016/j.foodhyd.2018.07.002

# Rheological behaviors and physical properties of plasticized hydrogel films developed from κ-carrageenan incorporating hydroxypropyl methylcellulose

Guohou Sun[a, b], Tieqiang Liang[a, b], Wenying Tan[a, b], Lijuan Wang[a, b,*]

[a] College of Material Science and Engineering, Northeast Forestry University, Harbin, PR China.

[b] Research Center of Wood Bionic Intelligent Science, Northeast Forestry University, Harbin, PR China.

*Corresponding author: Lijuan Wang, E-mail: donglinwlj@163.com, Tel.: +86-451-82191693

**Abstract:**

Flexible hydrogel films based on κ-carrageenan and hydroxypropyl methylcellulose (HPMC) were prepared. The effects of glycerol, sorbitol and PEG-400 on the film properties were studied. There was a good miscibility between κ-carrageenan and HPMC. With an increase in plasticizer content, the tensile strength and light transmittance of the film decreased, and the elongation at break, oxygen permeability, swelling ratio and film flexibility increased. The Fourier transform infrared spectroscopy, rheological and X-ray diffraction results indicated that the plasticizers formed new hydrogen bonds and had a disorderly restructuring with the κ-carrageenan and HPMC. Glycerol affected the properties of the κ-carrageenan/HPMC (CH) film to a greater extent than sorbitol and PEG-400. When the addition increased from 40% to 60%, the tensile strength decreased 24.22%, 18.23% and 12.80% and the oxygen permeability increased 10.72%, 23.92% and 47.49% for films plasticized with glycerol, sorbitol and PEG-400, respectively. Sorbitol-plasticized films showed an excellent strength, oxygen barrier, light transmission and thermal stability. Scanning electron microscopy showed that the increasing