

Accepted Manuscript

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PII: S0956-7135(17)30201-3

DOI: [10.1016/j.foodcont.2017.04.016](https://doi.org/10.1016/j.foodcont.2017.04.016)

Reference: JFCO 5568

To appear in: *Food Control*

Received Date: 18 December 2016

Revised Date: 6 April 2017

Accepted Date: 9 April 2017

Please cite this article as: Wu T., Wu C., Fang Z., Ma X., Chen S. & Hu Y., Effect of chitosan microcapsules loaded with nisin on the preservation of small yellow croaker, *Food Control* (2017), doi: 10.1016/j.foodcont.2017.04.016.

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Effect of chitosan microcapsules loaded with nisin on the preservation of small yellow croaker

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Abstract: Chitosan-nisin (CS-nisin) microcapsules were prepared and characterized. Its preservation properties (chemical stability, microbiological stability, color and sensory properties) were examined during the storage of small yellow croaker (*Pseudosciaena polyactis*). The results showed that CS-nisin microcapsules were spherical in shape with particle size greater than 1 μ m. Compared to nisin or CS treatment alone, a significantly higher efficiency of CS-nisin microcapsules in inhibiting microorganism growth, lipid oxidation and protein degradation was observed, extending the shelf life of small yellow croaker during the storage by 6 to 9 days in comparison with CS, nisin treatment alone or the control according to the TVC assay, suggesting a better preservation effect of the microcapsules.

Keywords: Chitosan, nisin, microcapsules, preservation property

1. Introduction

As a demersal warm-temperate fish species, small yellow croaker (*Pseudosciaena polyactis*) is widely distributed in Yellow Sea and the Northern East China Sea (Chen, & Cheng, 2013). It is a valuable marine fish with abundant nutrients, high-quality protein and unique flavor, which is favored by consumers. However, marine fish species is susceptible to spoilage with a limited shelf life even cold chain logistics has applied. Various methods have been proposed to control post-harvest quality of seafood, and the use of chemical preservatives is one of them (Rodrigues et al., 2016; Ghanbari, Jami, Domig, & Kneifel, 2013; Li, Li, Hu, & Li, 2013). Although chemical preservation is a good method in reducing enzyme activity and microbial contamination, it may raise safety concerns due to possible chemical residues on the seafood (Hui, Liu, Feng, Li, Gao, 2016). Therefore, development of natural biological preservatives, such as polysaccharides, proteins or lipids, polyphenol, or composites of these, has been a hot research topic in the past years (García, Rodríguez, Rodríguez, & Martínez, 2010; Imran et al., 2014).

Nisin, regarded as a safe biological preservative, has been approved to be used as a preservative in food industry (Chopra, Kaur, Bernela, & Thakur, 2014). It is a peptide

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