Accepted Manuscript

Physical and antioxidant properties of films based on gelatin, gelatin-chitosan or gelatin-sodium caseinate blends loaded with nanoemulsified active compounds.

Luis J. Pérez Córdoba, Paulo J.A. Sobral

PII: S0260-8774(17)30235-2

DOI: 10.1016/j.jfoodeng.2017.05.023

Reference: JFOE 8894

To appear in: *Journal of Food Engineering*

Please cite this article as: Luis J. Pérez Córdoba, Paulo J.A. Sobral, Physical and antioxidant properties of films based on gelatin, gelatin-chitosan or gelatin-sodium caseinate blends loaded with nanoemulsified active compounds., *Journal of Food Engineering* (2017), doi: 10.1016/j.jfoodeng.2017.05.023

Physical and antioxidant properties of films based on gelatin, gelatin-chitosan or gelatin-sodium caseinate blends loaded with nanoemulsified active compounds.

Luis J. Pérez Córdoba, Paulo J.A. Sobral*

Department of Food Engineering, College of Animal Science and Food Engineering, University of São Paulo, Av. Duque de Caxias North, 225. 13635-900, Pirassununga/SP, Brazil. *****E-mail: pjsobral@usp.br.

Abstract

The aims of this study were the development and characterization of active films based on gelatin (G), gelatin-sodium caseinate (G-Cs) and gelatin-chitosan (G-Ch) blends, applying active compounds (α-tocopherol, garlic essential oil and cinnamaldehyde) nanoemulsified in water (NACs). A microfluidization technique was used in the preparation of the O/W nanoemulsion. Following this, the emulsion system containing NACs was loaded into the film-forming solution. Films were prepared by the casting technique and thereafter characterized. Films based on the G-Ch blend plus NACs presented the lowest solubility and swelling and the highest hydrophobicity, as supported by the angle contact measurement. Analysis of the film microstructure obtained by SEM and FTIR exhibited a good compatibility among the G-Ch blend and showed that this matrix allowed a uniform distribution of the actives throughout the network. Films based on the G-Cs blend plus NACs showed the best antioxidant activity, highlighting its potential use as active packaging for shelf life extension of foodstuffs.

Keywords: Active films, edible films, biopolymers, antioxidant activity, essential oil, nanoemulsion.

1. Introduction

The development of biodegradable packaging has been the subject of much research in recent years, particularly with regard to renewable alternatives to traditional oil-derived plastics (de Vlieger, 2003). Biopolymer-based films on their own do not demonstrate the same material properties as traditional plastics, limiting their potential application, however, they present a promising alternative because they generally are non-toxic, biocompatible, biodegradable, cheap, renewable and edible materials (Chen et al., 2016; de Vlieger, 2003; Kurek et al., 2014).

Within biopolymers, proteins have attracted considerable attention by researchers, in particular gelatin (G), a globally produced/utilized protein for its availability and relatively low cost (Arvanitoyannis, 2002; Cao et al., 2007; Flaker et al., 2015). Gelatin is produced via partial acid/base hydrolysis of collagen. Several studies can be found in the literature regarding the production and