Use of seaweed and filamentous fungus derived polysaccharides in the development of alginate-chitosan edible films containing fucoidan: Study of moisture sorption, polyphenol release and antioxidant properties

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Abstract:

Alginate and fucoidan extracted from the brown macroalga Sargassum latifolium and chitosan derived from the filamentous fungus Aspergillus niger were used for the development of edible films with natural antioxidant properties. The incorporation of fucoidan and/or Ca²⁺ into the alginate-chitosan films decreased water solubility, but increased film thickness, water vapor permeability and oxygen permeability. The developed films showed good barrier properties against ultraviolet light. The interactions between film components were investigated using FTIR analysis which confirmed the presence of hydrogen bonded interaction. Kinetics of moisture sorption and polyphenol release exhibited a good fit to Peleg's model. Film moisture content at equilibrium was increased by fucoidan blending. Additionally, the water vapor diffusion and polyphenol release were expressed in terms of effective diffusion coefficient based on simplified Fick's second law. The developed films exhibited good antioxidant properties as measured by total antioxidant assay, ferric reducing antioxidant power and hydroxyl radical scavenging activity. Both film type and the type of the food simulant markedly affected the polyphenol release and the subsequent antioxidant activity of the films.

Keywords:

Extraction Alginate chitosan films Fick's second law FTIR Kinetics Peleg's model

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