

Combining Chitosan-Fish Oil-Green Tea Extract as A Potential Active Coating for Fresh Atlantic Bonito Fillet Preservation

Joana T. Martins^{1,2*}, Fernanda L. Ludtke^{1,2}, Jorge M. Vieira^{1,2}, Ítala Marx^{1,2}, Joana Solinho^{3,4}, Rita Pinheiro^{3,4}, António A. Vicente^{1,2}

¹Centre of Biological Engineering (CEB), University of Minho, Portugal; ²LABBELS Associate Laboratory, Braga/Guimarães, Portugal; ³Escola Superior de Tecnologia e Gestão, Instituto Politécnico de Viana do Castelo (IPVC), Portugal; ⁴Centro de Investigação e Desenvolvimento em Sistemas Agroalimentares e Sustentabilidade (CISAS) do Instituto Politécnico de Viana do Castelo, Portugal

Abstract:

Sustainable bio-based packaging materials are gaining increasing attention by food manufacturers and consumers, as possible substitutes for synthetic plastic materials. In particular, edible biopolymer coatings/films could be applied to highly perishable food products to preserve their freshness and increase shelf life. Atlantic bonito (*Sarda sarda*) is a well-known fish from Atlantic Ocean with pleasant taste and high nutritional value. However, it is susceptible to lipid oxidation and spoilage. Therefore, a sustainable and active coating formulation composed by chitosan (CH)-fish oil (FO)-green tea extract (GTE) was developed to be apply on Atlantic bonito fillets' surface to extend its shelf life. CH, FO and GTE were selected due to their well-known antioxidant and antimicrobial effects. A Central Composite Rotational Design was developed to evaluate the effect of coating/film compounds' concentration – CH (0.5-2.31%, w/w), FO (0.20-0.44%, w/w) and GTE (2%, w/w)

– on their physicochemical and functional properties (e.g., mechanical, barrier, surface properties). The changes in quality of fish fillets were also assessed, such as pH and textural analysis. Based on surface contact angle results, 1.25% CH-0.30% FO-2% GTE formulation (78°) was the most promising one due to good coating adhesion ability on fish fillets' surface. Also, this formulation showed to be a good barrier to water vapor (2.29×10^{-6} g/(m.s.Pa)) as well as good mechanical properties comparing to other tested formulations. The developed CH-FO-GET coating/film displays properties that allow its use as an environmentally friendly active food packaging system to be applied to Atlantic bonito fillets.