Design of Carvacrol-based active packaging for extending fresh fish shelf-life

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Abstract

Shelf life is the time-span where the product is in good conditions for consumption, from either safety or quality points of view. Shelf life is defined to guarantee food safety ("use-by" date), or to guarantee both safety and quality food standards ("best-before date").

The aim of active packaging systems is to extend shelf-life by releasing active substances into the food product. The active packaging is composed of one or several layers. Each layer may contain a given concentration of the active substance whose release velocity will depend on the layer material. An adequate selection of the layer composition and active substance initial concentration will have an impact on shelf life.

In this work, we use mathematical models in combination with optimization methods to (i) design the optimal configuration of the smart packaging for both "use-by date" and "best-before date" criteria; and (ii) assess and predict shelf life changes according to variations on storage conditions. Two different types of models are used: (i) release of the active substance into the food product [1]; and (ii) shelf-life evolution as a function of storage conditions and active substance concentration in the food [2].

The growth of *Listeria monocytogenes,* which affects widely consumed products, is used as the safety indicator. The KI-value, which is related to ATP-degradation compounds, is used as the quality indicator. Carvacrol is a substance that inhibits bacterial growth. In this work, it will be used as the active substance to limit the growth of *Listeria monocytogenes* (food safety) and other spoilage bacteria responsible for quality changes.

The optimal design allows for an increase in shelf-life of around 24% as compared with the fish product without active packaging.

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Provide five keywords separated by semicolon

Food shelf-life; Active packaging; Optimization; Fresh fish; Predictive models

Presentation

Oral

Topics

Integration of predictive modelling in simulation and optimisation of food processes