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DEVELOPMENT OF AN INTELLIGENT BIO-BASED PACKAGING SYSTEM

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Currently there is a growing interest in the development of eco-efficient bio-based packaging, being active, smart and intelligent packaging the most highlighted among various innovations. Intelligent packaging has the ability to detect and mark, in real time, changes that might occur within the package/in the food product. Their main purpose is to help the consumer decide whether to buy a certain food product, ensuring that when it is bought it has not suffered significant changes influencing its quality and safety.

This work aims at developing and characterizing a bio-based intelligent packaging (biosensor) using sodium alginate as matrix with the incorporation of a functional compound (anthocyanin obtained from grapes).

For the development of the biosensors different concentrations of sodium alginate were evaluated, namely, 1%, 2% and 3% (w/v). Subsequently, films were crosslinked with increasing concentrations of calcium chloride: 1%, 3% and 5% (w/v). These concentrations were chosen to allow an easy handling, a good processability and homogeneous structure. After choosing the concentrations of sodium alginate and calcium chloride, the functional compound (anthocyanin) was added in various concentrations, from an initial value of 0.5% ending at 5% (v/v). After selecting the amount to use in the biosensor production, its colour alteration was tested under different pH values, namely pH 2, pH 7.2 and pH 11.

The colour of the biosensor varied for different pH values, i.e. it was shown that the functional compound reacts to pH variations leading to a color change of the biosensor. Moreover, it was observed that independently of the amount of calcium chloride used, films can keep their integrity for a longer period when compared with sodium alginate films without crosslinking once these films were dissolved in distilled water after 10 minutes.

This work thus showed that a biosensor based on edible bio-based materials, which can be used in direct contact with food products, can be built and is a promising system aiming the increase of safety and quality of food products.