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Alginate-Based Composite Films as Innovative and Multifunctional Packaging Material for Extending Food Shelf-Life

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Extended Abstract

The packaging plays a key role in food industry for preserving the quality of many products [1]. Among packaging materials, plastic polymers are still the main commercially available. Unfortunately, their disposal after the use generated a huge amount of wastes worldwide due to their non-biodegradability, thus negatively impacting on the environment [2]. For these reasons, alginate, a renewable, and degradable biopolymer, is started to be proposed as highly versatile alternative material [3-5]. Sodium alginate (SA), an anionic polymer obtained from brown seaweeds [6], is constituted by linear block copolymers of (1→4)-α-l-guluronic acid (G), (1→4)-β-d-mannuronic acid (M) and heteropolymeric sequences of M and G (MG blocks) [4]. Although its largely use in food industry, it is highly hydrophilic [6]. For overcoming this drawback, SA-based waterproof composite films were realized by incorporating a polyphenolic extract derived from grape pomace into SA matrix, to be proposed as innovative and smart multifunctional packaging material for extending foods shelf-life. For achieving this goal, both the internal and external gelation methods when in presence of $CaCl_2$ were adopted during the SA-based hydrogel preparation steps. The obtained films were characterized from a physical and chemical point of view, for assessing their stability by varying different parameters such as pH, temperature, ionic strength, and different light sources irradiation. The films also exhibited antioxidant properties, tested after performing the ABTS assay, due to the Grape pomace polyphenolic extract embedded into the sodium alginate network. At the same time, polyphenols screened the light, thus protecting alginate particularly from UV-light degradation. Work is in progress for testing the antimicrobial activity of the proposed films and scaling up their production, for finally proposing them as novel bio-preservative composite material in food industry.

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