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BOOK OF ABSTRACT

Spermidine, a New Cationic Plasticizer for Polysaccharide- and Protein-Based Films

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The use of bio-based polymers for manufacturing biodegradable/edible materials, both to protect pharmaceuticals and to improve the shelf life of food products, is greatly increasing. Among them, several plant polysaccharides and proteins, representan abundant, inexpensive and renewable raw source. In addition, a major component of such hydrocolloid films is the plasticizer. The presence of a plasticizer generally reduces the intermolecular forces and increases the mobility of the polymeric chains, thereby improving the flexibility and the extensibility of the derived biomaterial. The most commonly studied plasticizers are polyols, like glycerol (GLY) and some mono or oligosaccharides. In particular, GLY not only increases film extensibility, but also migrates inside the film network causing often the loss of desirable mechanical properties of the material. Therefore, replacing GLY with a different plasticizer might help to improve film characteristics allowing potential industrial applications. To improve film properties it seemed of interest to test as plasticizers hydrophilic small molecules, like spermidine (SPD), containing amino instead of hydroxyl functional groups, thereby able to trigger ionic interactions with either polysaccharides or proteins. Pectin and bitter vetch (*Vicia ervilia*) seed proteins (BVP) were used to prepare hydrocolloid films, whereas GLY and SPD were added as film plasticizers, either singly or in combination, at various concentrations. Our results indicate that SPD increased the tensile strength and reduced the elongation at break of both pectin and BVP films, whereas blending of different amounts of both plasticizers were able to give rise to hydrocolloid films with mechanical properties tailored for specific applications.

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