




Recent advances in protein-based coatings for food packaging: a review

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Abstract

The huge and increasing volume of worldwide plastic waste is receiving considerable attention nowadays due to its resistance to disintegration and toxic environmental components that pose a hazard to humans. In response to this issue, several efforts have been concentrated on edible biopolymer-based food packaging. Biodegradable films and coating can be formed by macromolecules such as polysaccharides, proteins, and lipids. Among these compounds, protein is superior because of having strong intermolecular bonds that are essential for film formation. Protein-based coatings provide higher mechanical and gas barrier properties. However, the hydrophilic nature of proteins renders the water barrier qualities of their coatings inadequate. The capability to form protein-based films and coatings can be influenced by amino acids and their distribution and polarity which determines cross-bonds between hydrogen, amino acids, and disulfide bonds. The materials used to produce protein-based packaging films and coatings can be divided into two categories: vegetable proteins and animal proteins. Animal proteins (collagen, gelatine, etc.) and plant proteins, especially *graminacea* (wheat, maize, rice, barley, etc.), *asteraceae* (sunflower), and *leguminaceae* (beans), are currently the most well-investigated biopolymers for film and coating production. Low-cost raw materials, some of which are even agricultural waste, are utilized to make biopolymers. Various additives have been suggested to enhance the characteristics of coatings. Information about biodegradable films and coatings is widely cited in the references. This article exclusively provides the reader with an overview of protein-based

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Keywords Protein-based coatings · Food packaging · Edible coating · Plastic · Antimicrobial

Introduction

From ancient times, people have utilized synthetic plastic-based packaging for food products [1].

Synthetic films occupy a large part of the food packaging industry due to their superior gas and liquid barrier, mechanical characteristics, accessibility, low cost, and durability. However, Synthetic films exhibit significant resistance to degradation, resulting in white pollution [2]. Using incineration to deal with used synthetic films produces a lot of heat and toxic gases, which is a serious threat to human health and survival, it should be noted that petroleum resources are limited. To address these problems, sustainable packaging materials based on renewable natural biopolymers have been developed, and edible packaging has been confirmed as one of the best options. The raw materials used for biopolymers are very cheap and can be obtained from agricultural waste [2].

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