

Development of Pectin/Gelatin/Glutathione/Calcium Chloride Crosslinked Hybrid Composite Antioxidant Edible Coatings for the Preservation of Local Butter

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Given the vulnerability of butter to rancidity there continues to be a drive to develop active edible coatings to preserve the characteristics and prolong shelf-life of butter. In this work, inspiration is taken from biomedical and pharmaceutical research and crosslinked pectin-based edible composite coatings are developed for the preservation of butter. Pectin is blended with gelatin and glutathione to induce antioxidant characteristics and crosslinked with calcium chloride to overcome the problem of moisture sensitivity of neat pectin-based coatings. The blended active edible coatings exhibit significant preservation characteristics in coated butter in terms of peroxide, acid, and fatty acid values during the 60 days storage period with 15 days examination intervals in a calcium chloride dose dependent response. Furthermore, the developed coatings exhibit significantly improved antioxidant properties as assessed from β -carotene and 2,2-diphenyl-1-picrylhydrazyl (DPPH) activity in coated samples compared to control prolonging the shelf-life of coated butter. For the first time, it is demonstrated that pectin can be crosslinked to prepare edible coatings and extent of crosslinking can directly influence coating performance in food preservation. The obtained results are believed to be significant to the field and have the potential to disrupt the status quo in edible coating research and inspire commercial development of such coatings.

quality during transportation, easy to apply and potentially remove, economical and biodegradable where possible.^[1] In general, food packaging regulations demand that packaging materials should be non-toxic, fit for purpose, and not contaminate the food through leachates. There has been a drive to explore packaging materials that can enhance properties of packaged foods, which has been termed as active coatings.^[2] These active coatings can be made from edible materials, enhance the shelf-life of the packaged food while maintaining its sensory and quality characteristics.^[3] In addition, edible coatings preserve food by functioning as a barrier to avoid moisture loss and avoid oxidation mediated degradation of perishable food products.^[2] To this end, natural materials are gaining a significant interest as active edible coatings in food packaging to replace fossil fuels-based packaging materials given the environmental and potential health impacts. A range of natural

proteins and polysaccharides have been explored to develop active edible coatings for example, chitosan,^[4] gelatin,^[4b] alginate,^[5] starch,^[6] cellulose^[4c,7] and hyaluronic acid.^[4b] The use of natural proteins and polysaccharides in edible coatings has additional advantages including barrier properties (oxygen and

1. Introduction

Food packaging has become critical with globalization of the food industry in particular for fresh perishable food products. The primary aim of a food packaging material is to retain the food

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