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Investigations on Immobilizing Anthocyanin and Betacyanin onto Polyethylene Films

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The use of plastic polymers for food packaging has increased significantly over the past decades and the global market for polymers has increased to about 100 million tons today. Most of the packaging polymers are petroleum-based for cost reasons, ease of application and worldwide availability. However, besides serving as a physical containment for foods there is a growing need for food packaging to have additional properties. These include but not limited to serving as a substrate for antimicrobials and phytochemicals, platform for sensors to detect food spoilage, food deterioration, pathogen presence, potential deliberate contamination, as well as physical contaminants such as glass, metal pieces.
Phytochemicals are the secondary metabolites formed in fruits and vegetables that have a variety of health benefits. Two major phytochemicals present in fruits and vegetables are anthocyanins and betacyanins. Anthocyanins are a large subclass of flavonoids that are distinguished for their strong red to blue color in a variety of fruits and vegetables. Anthocyanins are potent antioxidants due to their phenolic structure and have antimicrobial function. We hypothesised that anthocyanin and betacyanin can be grafted directly onto PE using varying doses on eBeam and utilizing different types of extracted phytochemicals (source, and extraction method). We studied the grafting yield as well as the quality and functionality of the grafted phytochemicals. It is concluded that anthocyanin specifically when extracted with alcohol has a relatively good stability to high doses of eBeam even all the way up to 100 kGy. Anthocyanins can maintain their properties to a considerable degree; however, betacyanins are not resistant to eBeam irradiation. Polyethylene is a very strong and resistant polymer that even a high dose of 1000 kGy does not affect its surface or its properties. Therefore, polyethylene is not an ideal polymer backbone for grafting organic and phenolic materials.

Country/Organization invited to participate

United States of America

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