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Smart Food Packaging Using Natural Dye and Nanoclay as a Meat Freshness Indicator

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Abstract : Active and smart food packaging has been studied to control and extend the food shelf-life. However, active compounds such as anthocyanins (ACNs) are unstable to high temperature, light, and pH changes. Several alternatives to stabilize and protect the anthocyanins have been researched, such as adsorption on nanoclays. Thus, this work aimed to stabilize anthocyanin extracted from jambolan fruit (Syzygium cumini), a noncommercial fruit, to development of food package sensors. The anthocyanin extract from jambolan pulp was concentrated by ultrafiltration and adsorbed on montmorillonite. The final biohybrid material was characterized by pH and color. Anthocyanins were adsorbed on nanoclay at pH 1.5, 2.5, and 3.5 and temperatures of 10 and 20 °C. The highest adsorption values were obtained at low pH at high temperatures. The color and antioxidant activity of the biohybrid was maintained for 60 days. A test of the color stability at pH from 1 to 13, simulating spoiled food using ammonia vapor, was performed. At pH from 1 to 5, the ACNs pink color was maintained, indicating that the flavylium cation form was preserved. At pH 13, the biohybrid presented yellow color due to the ACN oxidation. These results showed that the biohybrid material developed has potential application as a sensor to indicate the freshness of meat products.

Keywords : anthocyanin, biohybrid, food, smart packaging
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