Molecular interaction and properties characterization of anthocyanin-based film and its application in freshness monitoring and preservation

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The increasing demand of food quality and safety has given rise to the intelligent and active packaging. The natural colorants with eco-friendly properties are integrated into packaging films. Among which, anthocyanins have been widely applied as the functional components due to their wide sources and multiple functions.

It is believed that various molecular interactions contained in the film matrix play the crucial role in the film properties. Hence, the kinds of molecular interactions between the bio-polymers and anthocyanins were studied based on our previous studies. Results demonstrated that molecular interactions could not only affect film physical properties by the formation of structural network, but also affect film functional properties (including pH-responsive, active and barrier characteristics) by controlling of anthocyanin release. Furthermore, the anthocyanin-based films with desirable functions were proved to show potent abilities in real-time freshness monitoring and efficient food preservation (such as better sensory profiles, lower TVB-N, TVC and k values, etc).

Our series of studies provided the basic insight into the molecular interactions, properties and applications of anthocyanin-based films. Nevertheless, further studies focusing on anthocyanin stability enhancement and preservation mechanism investigation of anthocyanin-based film are critically needed.

Keywords: Anthocyanin, Food packaging, Molecular interactions, Film properties, Real-time freshness monitoring, Food preservation