Synthesis of active hybrid films reinforced with cellulose nanofibers as active packaging material

Wan Amnin Wan Yahaya[a], Sarmilaah Dewi Subramaniam[a], Nurul Aini Mohd Azman[a], Fatmawati Adam[b], Maria Pilar Almajano[c]

[a] University Malaysia Pahang, Department of Chemical Engineering, College of Engineering, Lebuhraya Tun Razak, Kuantan, Pahang, Gambang, 26300, Malaysia

[b] University Malaysia Pahang, Faculty of Chemical and Process Engineering Technology, Lebuhraya Tun Razak, Kuantan, Pahang, Gambang, 26300, Malaysia

[c] Universitat Politècnica de Catalunya (UPC), Chemical Engineering Department (DEQ), Escola Tècnica Superior d'Enginyeria Industrial de Barcelona (ETSEIB), Av. Diagonal 647, Barcelona, 08028, Spain

ABSTRACT

Active packaging films derived from renewable biopolymers with an antioxidant formulation are a promising alternative in prolonging food shelf life. This study aimed to develop active hybrid films from semi-refined carrageenan, plasticized with glycerol, incorporating α-tocopherol, and enhanced with cellulose nanofibers derived from empty fruit bunch as reinforcing agents for improved film function in active packaging. The active hybrid films were characterized for their properties, and the release of antioxidant α-tocopherol was observed in food simulant and fresh meat. The application of the active hybrid films reinforced with cellulose nanofibers as active packaging for food products is presented.

KEYWORDS

Active packaging films; Antioxidant; Cellulose nanofibers; Semi-refined carrageenan; α-Tocopherol

ACKNOWLEDGEMENTS

This work was supported by the Ministry of Higher Education under Fundamental Research Grant Scheme (FRGS) No. FFRGS/1/2021/TK0/UMP/02/51 (University reference RDU210149) and Universiti Malaysia Pahang for financial support under grant PGRS210368.