

# PREPARATION AND CHARACTERIZATION OF SEMI-REFINED CARRAGEENAN REINFORCED WITH CELLULOSE NANOFIBER INCORPORATED WITH A-TOCOPHEROL AS AN ACTIVE FOOD PACKAGING

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## Abstract:

Recent alternative in the development of bioactive packaging films which contribute both to reduce waste disposal problems and prolong shelf life of food have received attention among consumers. Semi-refined carrageenan (SRC) based film plasticized with glycerol (G) reinforced with different concentration cellulose nanofibre (CNF) (2%, 5%, 7%, and 10% [w/w]) incorporated with 0.4% (w/w)  $\alpha$ -tocopherol were prepared for food packaging application. Functional mechanical and physical properties of SRC-based films were characterized. The release of antioxidant  $\alpha$ -tocopherol from SRC-based film were studied based on total phenolic content (TPC) and 1,1-diphenyl-2-picrylhydrazyl (DPPH) throughout 31 day storages. FTIR spectra analysis provided some insight interaction between SRC, glycerol, CNF and antioxidant  $\alpha$ -tocopherol. The result shows incorporation of CNF increased the mechanical properties of SRC-based film when compared to the control film. The filling effect of CNF caused an increase in elongation and tensile strength. When a high content of CNF (10%) was incorporated in the films, the water solubility was decreased due to the reduction of hydrophilic domains in the film matrix. Moreover, addition of  $\alpha$ -tocopherol into films contained phenolic compounds displayed strong antioxidant activities. These results demonstrate that CNF and  $\alpha$ -tocopherol can significantly enhance the mechanical properties, antioxidant ability, and reduce the water solubility of SRC-based films that can be used as an active food packaging material. Hence, the incorporation of CNF into SRC-based film could be an alternative way to replace non-biodegradable plastic whilst reduce the use of synthetic antioxidant directly into food product.

**Keywords** : Cellulose Nanofibre; Semi-Refined Carrageenan; Natural Antioxidant

## **Acknowledgement**

The authors would like to acknowledge Faculty of Chemical Engineering and Natural Resources, Universiti Malaysia Pahang for the facilities and funding under the grant RDU160381.