

Colloquium on Applied Sciences 2 2024

8-14 July 2024, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

Starch Films Reinforced with Microcrystalline Cellulose from Cassava Peel

Nur Aribah Wajihah^a, Maryam Husin^{a*}

Structured Abstract

Background: Starch is a popular substance for biodegradable plastic film as it renewable, abundant, and cost-effective. Nevertheless, films made from starch have poor mechanical, thermal, and properties, as well as low resistance to water, especially in the presence of moisture and humidity. The addition of microcrystalline cellulose fillers to biopolymer films can improve this issue. The purpose of this study was to examine the impact of MCC on the characteristics of starch films, as well as to analyze the physical properties and composition of the filler in the developed biodegradable starch films.

Methods: Starch films were reinforced with microcrystalline cellulose (MCC) obtained from Cassava Peel (CP-MCC). The amount of CP-MCC used ranged from 0.2ml to 1.0ml. The characterization techniques, such as FTIR, are used to determine the functional groups present in the developed biodegradable plastic. In addition, this research has included solubility and biodegradability tests.

Results: FTIR spectra exhibited that the intermolecular interaction in starch film CP-MCC occurred through O-H, C=O, C-O-C groups. The highest solubility was recorded at 15.66 % for CP-MCC. CP-MCC shown the decrease in water solubility as the amount of MCC increases. This is because the addition of additional MCC can enhance the films' water resistance. Furthermore, the results of biodegradability tests indicated a direct correlation between the quantity of filler utilized and the percentage of weight reduction. The weight loss percentage of the produced starch film increased from 9.09% to 17.53% with an increase in CP-MCC.

Conclusion: This research shown that the addition of MCC can enhance films to be stronger. There are also shown a significant improvement in flexibility, and barrier properties due to the structural characteristics and compatibility of CP-MCC with starch matrices. The resulting films obtain an eco-friendly aspect through the incorporation of CP that minimizes waste and satisfies customer demand for eco-friendly packaging solutions.

Keywords: Microcrystalline cellulose (MCC), *Cassava* peel, biodegradable plastic film

*Correspondence: marya911@uitm.edu.my

^a School of Chemistry & Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia