TITLE:
MORPHOLOGICAL ANALYSIS OF SPIRULINA ALGAE FILLED POLYLACTIC ACID BIOFILM

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2023

ABSTRACT

There is a growing public demand for fast biodegradable plastic especially in packaging industries. The development of biodegradable plastic is one of many solutions to this problem. The used of petroleum-based plastic are kindly worried because of its effect on the environment such as giving risk to the marine ecosystem and pollution to the land, water and so on. The used of polylactic acid in this project are directly a better way since it is one of the biodegradable polymers with a high rate of degradation. Polylactic acid is applied as it is a compostable alternative to many products. However, the application of PLA is constrained by its slow rate of deterioration and fragility. Spirulina algae was used as a filler for this biofilm because it can lower the cost and increase the degradation rate. The making of biofilm in this project was done by using the solution casting method. The polylactic acid beads were stirred with dichloromethane (DCM) as one of the effective chemical solvents for the PLA and the addition of algae in the mixture and the casting process. The study of morphological analysis in this project was showed the miscibility of polylactic acid and spirulina algae as well as the proven of polylactic acid and spirulina appearance in the biofilm.

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CHAPTER ONE
BACKGROUND

1.1 Introduction

Although plastic materials are of high quality, with their numerous make-ups and manufacturing costs, it is of great concern whether this plastic material can be managed appropriately in our society. While plastics have become highly valued for their long-term functional use, many concerns about plastics-related environmental hazards and energy crises have recently surfaced. Consumers, on the other hand, are becoming more aware of the negative environmental effects of plastics. As a result, bio-based and biodegradable polymeric materials are one of the most appropriate means to realise this goal because they can be sustained and handled in the global environment. These facts have fueled interest in biodegradable polymers, particularly biodegradable biopolymers. In the 1980s, biodegradable plastics and polymers were first introduced.

Packaging waste, particularly that made of non-biodegradable polymers, has become a significant component of municipal solid waste, raising environmental concerns. Antimicrobial packaging, as one of the unique packaging materials, benefits not only consumers but also food and hygiene products. The innovative packaging is capable of extending product shelf life by deactivating or reducing the growth of various bacteria or fungi that are harmful to human health (Zhong et al., 2020). Biopolymers can be used to replace non-biodegradable plastics in order to reduce environmental impact and reliance on petroleum. Biopolymers, as an alternative bio-packaging material, enable packaging materials to be completely biodegradable or compostable.

Biodegradable polymer materials, particularly food biopolymer films consisting of polysaccharides and proteins, are the current trend in food packaging systems, however they are constrained by mechanical strength and barrier qualities (Liao et al., 2023)Food packaging that is environmentally friendly and sustainable is becoming more and more important (Gupta et al., 2022). On the other hand, bioplastic serve a crucial role as a biodegradable component in order to control the global pollution caused by non-degradable plastics because of the biological interactions between bacteria and other