CHARACTERIZATION AND MECHANICAL PROPERTIES OF POLYVINYL ALCOHOL/TAPIOCA STARCH FILLED WATER HYACINTH FIBRE BIOFILM

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ABSTRACT

CHARACTERIZATION AND MECHANICAL PROPERTIES OF POLYVINYL ALCOHOL/TAPIOCA STARCH FILLED WATER HYACINTH FIBRE BIOFILM

This study focuses on the development and characterization of a biofilm made of polyvinyl alcohol (PVA), tapioca starch, and water hyacinth fibers (WHF). The goal is to determine the potential of this biofilm as a sustainable and functional material with improved mechanical qualities. The biofilm is created via a casting process, which incorporates variable WHF loadings into the PVA/tapioca starch matrix. The resulting biofilms were characterized by their functional groups using Fourier Transform Infrared (FTIR) spectroscopy, and it was discovered that the cellulose biofilm of WHF and tapioca starch increased at the peak of 1414 cm^{-1}, resulting in a strong biofilm. The addition of WHF had enhanced the tensile strength and Young's modulus, while tensile strain decreased, indicating that the biofilm is stiffer and more rigid. The biofilms were soluble in water, thus when submerged and agitated in distilled water, the films lost weight. Next, the film's biodegradability rose as the fiber concentration grew. The optimal WHF loading was discovered to be 10% w/w, resulting in good mechanical and physical properties. This study is expected to shed light on the feasibility and potential of WHF-filled PVA/tapioca starch biofilms as eco-friendly alternatives to conventional synthetic materials. The improved mechanical qualities, along with biodegradability, pave the door for applications in packaging, agriculture, and other industries looking for sustainable material solutions.

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