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A Creative Investigation of Biopolymer-Based Composites with Additives

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Abstract

In recent years, research into biopolymer uses has expanded quickly. The many uses available now show how far biopolymers have come in overcoming obstacles and overcoming all disadvantages to replace synthetic polymers made from petroleum-based resources. Their exceptional qualities and adaptability to adjustments using various techniques are to thank for their relevance. The processing additives effectively transform the biopolymers into more adaptable and dynamic materials, leveraging and expanding their uses in drug delivery, food packaging, cars, healthcare, and agriculture. Some common biopolymers were categorised in accordance to their sources and methods of extraction for this review. These biopolymers have active groups that enable them to interact with one another to create biocomposites.

Keywords: Biopolymers; Biopolymer-based composites; Biocomposites

Introduction

In recent years, the study of biopolymers has advanced technologically, drawing the interest of multidisciplinary scholars. And this is due to the danger to human health and the environment caused by the overuse of non-biodegradable materials and the ensuing, always rising desire for a greener, safer world. Through the use of biopolymers, these investigations have produced a very intriguing outcome and made progress against the issue of economic and ecological unsustainability caused by conventional polymers. The natural source of biopolymers, which consists of monomers of amino acids, saccharides, and nucleic acids connections in the form of linear or branched structured structures, can be obtained naturally or chemically manufactured [4]. Researchers have discovered that biopolymers have manipulable mechanical properties and are environmentally benign and biodegradable. They can replace the traditional non-biodegradable polymers because they are both biocompatible. Despite the fact that the search is still ongoing, numerous types of biopolymers have been discovered that are equally suited because of their superior biodegradability, light weight, and effective barrier properties. [1].

Biopolymer

Biopolymers, also known as synthetic biopolymers, are polymers that can be chemically created to be biodegradable or that are abundantly present in nature. These include carbohydrates, proteins, and nucleic acids. Since 2008, they have been used more frequently each year and are primarily obtained from plants, animals, and bacteria. Biopolymers made from plants including corn, rice, seaweed, hemp, and recycled materials are eco-friendly, non-toxic, recyclable, effective, and long-lasting, according to Wilton et al. According to their place of origin, biopolymers are often categorised in Fig. 1. At the moment, traditional petroleum-based products rule the commercial polymer market. However, scientists believe that biopolymers will soon dominate the market as they obtain the ability to compete [2].

The most widely used natural substance that is derived from various plants and microorganisms in the form of Nano fibrils or nanocrystals is cellulose. The global market for cellulose was valued at USD 219.53 billion as of 2018. Its annual output is 1.5 1011 tonnes. By 2026, it is anticipated to reach USD 305.08 billion. Cellulose is made up of D-anhydroglucopyranose that is joined by - (1, 4)-glucosidic linkages that are defined by hydroxyl groups that change the way it behaves by forming hydrogen bonds. Contrary to bacterial cellulose, which exists in its purest form, cellulose produced from cotton, jute, flax, wood, and hemp is combined with hemicellulose and lignin to exist more as fibres. Various structures, including micro- and nanostructures, can be created from cellulose. Different modification techniques can change [3, 4, 5].

Due to the ease with which the active hydroxyl groups on the surface can be functionalized by a variety of chemical species, cellulose can easily be converted through a variety of modification processes into a variety of derivatives, including ethyl acetate, carboxymethyl cellulose, hydroxymethyl cellulose, nitrocellulose, etc. Cellulose is extremely adaptable and can be used in a variety of items, including cosmetics, food, fillers, building materials, laminates, adhesives, paper, textiles, and chemicals for oil fields. Additionally, cellulose is used to create cutting-edge energetic materials such homogenous solid propellants and gunpowder. Due to its special qualities, such as photochemical stability, moderate crystallinity, high glass temperature, high chemical, and solubility in various solvents, cellulose can be used in a variety of applications [6, 7, 8].

Conclusion

The usage of biopolymers in a variety of applications has been shown to have a bright future in alleviating the causes and effects of anthropogenic human activity related to the manipulation of chemicals in the environment. Because they are biocompatible, biodegradable, and non-toxic, biopolymers including cellulose, starch, chitosan, sodium alginate, and others contribute to a greener and safer world. Even if biopolymers have good qualities, adding additional components, such as additives, helps them get around the problems with hydrophilicity, biocompatibility, and biodegradability. The majority of biopolymers and additives may be found in nature, making

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them more dependable research materials. Due to their light weight, natural fibres are frequently utilised as additives in automobiles to lower fuel consumption [9, 10].

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Conflict of Interest

The authors affirm that they have no known financial or interpersonal conflicts that would have appeared to have an impact on the research presented in this study.

References

1. Brito FMS, Bortoletto Júnior G, Paes JB, Belini UL, Tomazello-Filho M (2020) Technological characterization of particleboards made with sugarcane bagasse and bamboo culm particles. Constr Build Mater 262:120501.
2. Aydin I, Demirkir C, Colak S, Colakoglu G (2017) Utilization of bark flours as additive in plywood manufacturing. Eur J Wood Prod 75:63-69.
3. Rajeshkumar G, Seshadri SA, Devnani GL, Sanjay MR (2021) Environment friendly, renewable and sustainable poly lactic acid (PLA) based natural fiber reinforced composites-A comprehensive review. J Clean Prod 310:127483.
4. Pędzik M, Janiszewska D, Rogoziński T (2021) Alternative lignocellulosic raw materials in particleboard production: A review. Ind Crops Prod 174:114162.
5. Lee SH, Lum WC, Boon JG (2022) Particleboard from agricultural biomass and recycled wood waste: A review. J Mater Res Technol 20:4630-4658.
6. França WT, Barros MV, Salvador R (2021) Integrating life cycle assessment and life cycle cost: A review of environmental-economic studies. Int J Life Cycle Assess 26:244-274.
7. Hammiche D, Boukerrou A, Azzeddine B (2019) Characterization of polylactic acid green composites and its biodegradation in a bacterial environment. Int J Polym Anal Charact 24:236-244.
8. Couret L, Irle M, Belloncle C (2017) Extraction and characterization of cellulose nanocrystals from post-consumer wood fiberboard waste. Cellulose 24:2125-2137.
9. Haag AP, Maier RM, Combie J (2004) Bacterially derived biopolymers as wood adhesives. Int J Adhes 24:495-502.
10. Soubam T, Gupta A, Sharma S (2022) Mechanical property study of plywood bonded with dimethylol dihydroxy ethylene urea crosslinked rice starch-natural rubber latex-based adhesive. Mater Today Proc.