Title:

Recent Developments in Cassava (Manihot esculenta) Based Biocomposites and Their Potential Industrial Applications: A Comprehensive Review(Review)

Journal:

Materials, Volume 15, Issue 19

Document Type: Article

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Full text link:

Publisher : https://www.mdpi.com/1996-1944/15/19/6992

Scopus preview:

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85139980455&doi=10.3390%2fma15196992&partnerID=40&md5=3b5a5055ea371789b38fb693bc3 a1a34

Abstract:

Recent advances in the research on cassava (Manihot esculenta) biopolymers and fibers, and their potential industrial applications, were discussed. Properties of starch, fibers, polymers, and composites derived from cassava were discussed. Efforts to enhance the properties of cassava composites were brought into focus. Detailed reports on macro and nano-sized cassava fibers and starch, and their fabrication as blend polymers, biocomposites, and hybrid composites, were reviewed. Highlights: The rapid use of petroleum resources coupled with increased awareness of global environmental problems associated with the use of petroleum-based plastics is a major driving force in the acceptance of natural fibers and biopolymers as green materials. Because of their environmentally friendly and sustainable nature, natural fibers and biopolymers have gained significant attention from scientists and industries. Cassava (Manihot esculenta) is a plant that has various purposes for use. It is the primary source of food in many countries and is also used in the production of biocomposites, biopolymers, and biofibers. Starch from cassava can be plasticized, reinforced with fibers, or blended with other polymers to strengthen their properties. Besides that, it is currently used as a raw material for bioethanol and renewable energy production. This comprehensive review paper explains the latest developments in bioethanol compounds from cassava and gives a detailed report on macro and nano-sized cassava fibers and starch, and their fabrication as blend polymers, biocomposites, and hybrid composites. The review also highlights the potential utilization of cassava fibers and biopolymers for industrial applications such as food, bioenergy, packaging, automotive, and others.