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REVIEW ARTICLE

Sustainable recycling technologies for thermoplastic polymers and their composites: A review of the state of the art

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Abstract

This review article discusses the environmental and economic effects of recycling, as well as sustainable thermoplastic polymer recycling technologies. Several researchers have utilized recycled thermoplastics as matrices in the production of a variety of natural and synthetic-based composites, which is also the focus of this study. All of the industries (food and packaging, construction and building, transportation, and indoor usage) where recycled thermoplastics have a large market share (food and packaging, construction and building, transportation, and indoor usage) are covered in this review. The desirable properties of thermoplastic polymers, such as corrosion resistance, low density, and user-friendliness, have caused plastic production to surpass aluminum and other metals in use over the past 60 years. Furthermore, recycling is one of the most important measures available to mitigate these effects and is one of the most dynamic segments of the plastics industry at present. Increased landfilling and incineration of plastics have a negative impact on the ecosystem, and the continued increase in the production of virgin fossil plastic also has a negative impact on the environment. Consequently, this continuous production could lead to the depletion of fossil fuel resources, an increase in environmental emissions during processing, and eventual incineration. Increasing numbers of nations are adopting the circular economy concept in an effort to avoid all of these problems. This concept emphasizes the reuse of products and resources, as well as the recycling of materials according to the waste hierarchy, rather than their cremation or disposal in the environment.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.