Chapter 3
Green Materials in Hybrid Composites for Automotive Applications: Green Materials

N. M. Norizan
Universiti Putra Malaysia, Malaysia

A. Atiqah
https://orcid.org/0000-0003-0583-7486
Universiti Tenaga Nasional, Malaysia

M. N. M. Ansari
Universiti Tenaga Nasional, Malaysia

M. Rahmah
Universiti Teknologi MARA, Malaysia

ABSTRACT

The increasing trend of using bio-based fibre, also known as natural fibre, provides many benefits for long-term environmental preservation. In the biocomposites group, green composites are a specific class whereby the bio-based polymer is reinforced with natural fibre. The current review deals with the advance of green materials in hybrid composites for automotive applications. The variation of green materials such as natural fibres is developed to be used as hybrid green materials as reinforcing materials in composites. There are many works done by another researcher that showed the improvement of utilizing the green materials of composites. The application and challenges of having green materials in composites for automotive applications are also presented.

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INTRODUCTION

One of the main reasons to be called green composite is the composites that consisted of bio fibre or natural fibre as fibre reinforcing in the material composite. There is a different type of fibres used in composite materials such as particle, continuous, and discontinuous fibre reinforcement. The role of reinforcing fibre in the composite is to carry the applied load and stress and conveys enhanced the mechanical performance, as well as the stiffness and strength to the composites. Moreover, the essential of green materials in the composites is the biodegradable polymer that acts as a continuous phase or well knows as a matrix in distinguishing the demanding properties of the green composites. The benefits of having biodegradable polymers are can reduce the emissions of synthetic polymer in landfill that leads to preserving the composite against environmental and chemical attack. Besides, this biodegradable polymer can hold and binds the biofibre together and transfer the load. (Karim & Afrin, 2017; Thakur, Thakur, & Gupta, 2014). In another definition by Koronis et al. (2013), composite materials are classified as green composites is mainly due to their renewable and natural-based resources, degradable, and sustainable. These green material composites can be easily disposed of without harming the environment. While, the definition of natural-based material is a product made from renewable agriculture and forest products, including crops and crop by products and its residues. The general scheme of green composites comprising natural fibre reinforcement with bio-derived resin will produce green composites or biocomposites, as shown in Figure 1.

The application of green material composites is the replacement of synthetic fibre-glass and steel in automotive parts. The primary market identified that those green materials installed in automotive are the trim parts in-cabin linings, parcel

Figure 1. The general rule of green composites; adapted from (Saba, Jawaid, Sultan, & Alothman, 2017)
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