

Chapter 7

Green Composites and Their Properties: A Brief Introduction

Deepak Verma

Graphic Era Hill University, India

Xiaolei Zhang

Queen's University Belfast, UK

Prakash Chandra Gope

College of Technology, India

Siddharth Jain

University of Alberta, Canada

Rajneesh Dabral

Graphic Era Hill University, India

ABSTRACT

Green composites are important class of biocomposites widely explored due to their enhanced properties. The biodegradable polymeric material is reinforced with natural fibers to form a composite that is eco-friendly and environment sustainable. The green composites have potential to attract the traditional petroleum-based composites which are toxic and nonbiodegradable. The green composites eliminate the traditional materials such as steel and wood with biodegradable polymer composites. The degradable and environment-friendly green composites were prepared by various fabrication techniques. The various properties of different fiber composite were studied as reinforcement for fully biodegradable and environmental-friendly green composites.

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INTRODUCTION

The first natural fibre based composites were appeared in 1908. Green composites are a specific part of bio-composites, in which bio-based polymer matrix is reinforced by natural fibers; they symbolize a developing area in polymer science. In a situation like increment in oil price, the use of green composites is helpful not only in making the environment better but also from an economical perspective. The newest development in the field of bio-composites is the substitution of oil-derived polymers with polymers from renewable resources as the matrix component. Such materials are termed as “green composites”. Green composites are less in cost and are decomposable. There is a mounting need to develop bio- based products and other advanced skills that can decrease our dependence on fossil fuel. Bio-based resources include industrial goods, wood, wood wastes and remains. Bio composites which are eco-friendly are new materials they are not just a solution to growing environmental danger but also as a solution to the ambiguity of petroleum supply. Green composites, which are a mixture of natural fibers and bio plastics, have appeared as hopeful replacements to conventional glass fiber composites because they carry a widespread range of benefits, such as biodegradability, renewable and low density. In recent years, efforts have been made to lessen the use of expensive glass, carbon fibers and also reduce the car’s weight by taking advantage of the lower density natural fibers. Natural fibres like sisal, jute, abaca and coir are been in use as reinforcement in composites. Most of the composites are built using polymers and synthetic fibers. These polymers are threat to the environment. As a result, bio based composites have drawn much attention. As compared to synthetic fibres, natural plant-based fibres have various advantages. These natural fibres are low in cost, high thermal insulation and biodegradability. At present, numbers of biodegradable and green composites have been advanced with enhanced mechanical properties using different natural fibers. The performance of green composites relies on the properties of the natural fibers used for reinforcement. Though, green composites have some drawbacks, but these natural fibers don’t have any effect on the environment hence, are useful.

Mechanical Properties

Georgios Koronis et.al (2013) have explored about the use of numerous green composites in automobile sector. Green composites made with the help of resins and plants (using plant fibres) are already been in use in automobile. Some tests were performed on the green composites to check their various performances for different application. Table 1 shows results of various tests done on several reinforced bio-resins with different kinds of natural fibres. From the data in Table 1 most of the

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