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Experimental investigations on synthesis and characterization of tamarind seed powder reinforced Bio-composites

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Abstract

The entire world is poignant towards the eco-friendly manufacturing stratagem; especially most of the plastic components were slowly replaced by the natural composites. In the automobile sector, some of the popular car manufacturers were concentrated to replace interior plastic materials with natural fiber-based composite materials. A novel development of bio-composite materials augments to reduce global warming and ecofriendly environment. In this research work, the agricultural waste of tamarind seeds powder is used as a bio-composite material, which is blended with Epoxy LY556 in various weight percentages and fabricated. The tamarind seeds powder varies from 5 to 30% with Epoxy resin, Methyl Ethyl Kethone Peroxide is used as an accelerator, and Cobalt is used as a Catalyst. The bio-composite plates were fabricated by the Compression moulding techniques. The mechanical properties of composite materials were studied in the enhancement of Epoxy resin's impact in the weight percentage range.

Introduction

Tamarindus indica is a leguminous tree in the family Fabaceae indigenous to tropical Africa. The tamarind tree produces edible, pod-like fruit which is used extensively. The magic of value addition can be made with help of composite i.e. scrap as raw material [1], [2]. The tamarind seed usually an agricultural waste, but recently found some medical drug applications [3], preparing gum [4], biomedical i.e. Bio-inspired nanocomposites for bone tissue engineering [5], the composite films using polyvinyl alcohol and carboxymethyl tamarind gum, and the developed films can be explored for skin tissue engineering and drug delivery applications [6]. A complex coacervate was prepared by [7] with whey protein isolate (WPI) and tamarind seed mucilage (TSM) and the WPI-TSM complex coacervate can be used as an economic and nutritionally valuable alternative for food additives. spice-fused tamarind seed starch edible films for meat packaging [8]. The environmentally friendly composite material can be made with tamarind seed gum and banana fiber. It is biodegradable also. The composite strength varies with the kind of banana fiber. The red banana fiber used composites are stronger than proven banana tee fibers [9], [10], [11], [12]. The green composite can be manufactured by Using biopolymer cellulose as the matrix and 25wt% tamarind nut powder as filler must be loaded [13], [14], [15]. This research also made such an attempt of preparing eco-friendly green composite and also biodegradable composite with tamarind nut powder with epoxy matrix.The objective of the research is to fabricate seven different composite plates and explore of its characteristics.

Section snippets

Selection of matrix and reinforcement

The Epoxy resin LY556 which is used as the matrix material in this work, the resin is purchased from Covai seenu & company, Coimbatore. We have used 3kg of our project. The Epoxy LY 556 is basically belongs the chemical family of “epoxide” is used bonding material of the matrix material. In some of the composite bonding by using the Biphenyl Diglycidyl. The IUPAC name NN0-bis (2-aminoethylethane-1, 2-diamin) used as hardener blended with epoxy. The natural fiber composite fabricated in the…

Tensile strength of the tamarind seeds Filled epoxy composites

The tensile behavior of particulate composites was measured using the Universal Testing Machine (Make: FIE Pvt Ltd, Yadrav& Model: UNITEK-94100) at a cross-head 22 Stroke of 1000mm and Clearance between columns=650mm. Range of testing=0KN to 100KN.Power supply=1PH, 230V A.C, and 50Hz. The tensile strength of the Epoxy composites was verified in digital display using a load of 1 to 2.5kg. The tensile test results reported in this work are the average of three independent tests.

A…

Conclusions

In this study, we investigated the mechanical behaviors of Tamarind seeds. Particulate composites were created by combining various fabrication parameters. Composites were made by mixing 30wt% particulate content and 100–70wt% resin content, with the results given below.

1. A maximum tensile strength of 11.2MPa was achieved with 20wt% of Tamarind seeds and 80wt% of Epoxy composites.…
2. composite made of 30wt% Tamarind seeds and 70wt% Epoxy resin reached 76MPa in compression.…
3. The composite…

…

Declaration of Competing Interest

No funding is received by the authors for performing this research work.…

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