A Survey on Mechanical Activities on Coir Fiber Resistant Polymer Matrix Composites

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Abstract

Polymeric fiber reinforced composite materials have played a dominant role for a time-consuming in a diversity of applications for its high strength along with specific modulus. The fiber serves as reinforcement in reinforced plastics or natural may be unrealistic. Previous studies illustrate that just artificial fibers such as glass beside with carbon etc., have been used in backbone resistant plastics. Experiments were carried out to learning the produce of backbone extent on the mechanical behavior of these composite materials based epoxy polymer. These results indicate that coconut fibers can be used as a reinforcing material for many potential structural and non-structural applications. This work will be expanded further to study other aspects of such compounds, the effect of fiber, fiber landmark, loading prototype fiber treatment on the mechanical behavior of coconut fiber composites based polymers. Finally, the SEM of fracture surfaces was done to study the surface morphology.

Key Words: *Metal Matrix Composites, Ceramic Matrix Composites, Scanning electron microscopy*

1.Introducation

The advantage of composites over conventional materials are derived largely from its higher specific power, rigidity and low energy characteristics, which allows the structural design is more versatile. By definition, composite materials are composed of two or more components physically separable phases [1, 2]. The matrix or folder (organic otherwise inorganic) sustain the situation along with orientation of the reinforcement. Significantly, the components of composite materials retain their personal, physical as well as chemical element properties still together produce a combination of qualities that the individual constituents would be unable to produce alone.

1.1 Category of Composites

For the sake of straightforwardness, Nonetheless, the compounds can be grouped into type related to the nature environment of the matrix of each type has [3]. Manufacturing methods also vary according to the physical and chemical properties of matrices and reinforcing fibers properties.

(A) Metal Matrix Composites (MMCs):
Metal matrix merged, as the name put forward, have use a metal matrix. Illustration such as matrices in composite materials takes in aluminum, magnesium along with titanium. The typical fiber includes carbon in addition to silicon carbide. Reinforced metals are mainly to fit design needs. For example, the spring stiffness along with the potency of metals can be amplified while large thermal extension coefficient also thermal as well as electrical conductivities of metal can be complete by adding fibers such as silicon carbide.

(B) Ceramic Matrix Composites (CMC)
Materials are ceramic matrix composites such as alumina ceramic matrix, calcium, aluminum silicate reinforced by silicon carbide. CMC advantages include high strength, toughness, high temperature limits for ceramics service, low-density and chemical inertness. In nature resistant to highly temperature ceramic materials have a tendency to be converted into brittle with to fracture. Composites made successfully through ceramic matrices are reinforced by way of silicon carbide fibers. These compounds offer the same tolerance to high temperature superalloys but such a high density. The brittle nature environment of ceramics make manufacture difficult composite.

(C) polymer matrix composites (PMCs)
The most common are sophisticated combination. These are most ones Composite resources consist of a thermoplastic or thermosetting polymer reinforced by fiber (natural element carbon otherwise boron). These materials may be formed in a diversity of shapes along with sizes. They provide a high strength and stiffness, along with corrosion resistance. The reason for this is more common is their low cost, elevated strength and easy fabrication principles. Because of the low density component of polymeric composite materials often show a specific excellent properties.

1.2 Natural Fiber Composites

Polymeric fiber reinforced complex resources have been played a main role for a long time in a mixture of applications for its high strength and specific modulus. The manufacture, use and disposal of traditional fiber reinforced plastic, usually glass, carbon or aramid fiber reinforced thermoplastic and thermosetting resins are considered critical due to environmental problems. By natural fiber composite materials we mean a composite material is reinforced with fibers, particles or platelets of natural otherwise renewable resources, in difference to for example carbon backbone or agamid have to be synthesized. Natural filament is made from plant sources, animals world as well as minerals. Natural backbone can be top secret according to their origin. The complete classification is revealed in Figure 1.

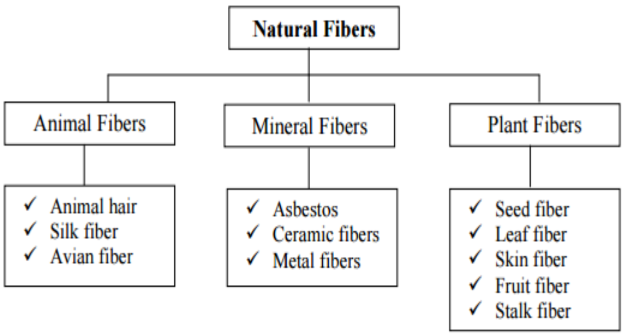


Figure 1 Classification of natural fibers

2 Polymer Composites

(i) On natural fiber reinforced composites

The mechanical material goods of a composite material reinforced with natural fibers depends on many parameters, such as backbone potency, modulus, backbone length along with orientation, in adding together fiber-matrix interfacial connection strength. boundary a strong fiber-matrix bond is critical to the mechanical properties of the composites. A good interfacial bond for the effective stress transfer from the matrix of the fiber so the maximum use of the backbone strength in the composite [4] is achieved is necessary. Modification of the backbone also improves the resistance to deprivation moisture induced interface and properties of the compound [5]. In addition, factors such as processing conditions and techniques have a significant control on the mechanical goods of backbone reinforced complex [6]. The mechanical properties of normal backbone, especially flax, hemp, jute along with sisal, are extremely good benefit can compete with fiber-glass in force and also modulus [7,8] specific. A number of investigations have been behavior on various types of normal fibers such as hemp, flax, bamboo, jute along with to learning the effect of these backbone on the mechanical material goods of compounds [7,8,9] materials. Mansour and Aziz [10] studied bamboo mesh reinforced cement compounds in addition to found that this reinforcing material may increase the ductility and toughness of the cementitious matrix furthermore much increase their tensile power, flexural, along with the impact forces. moreover, the polyester composites reinforced jute fabric were tested to evaluate the mechanical properties and compared with wooden compound [11], and found that the compound of jute backbone has better strengths that compounds wood. A pulp backbone resistant thermoplastic composite was investigated along with found that a mixture of stiffness increased by a cause of 5.2 and the strength increased by a issue of 2.3 compared to virgin polymer [13]. Information on the utilize of banana fibers in underline polymers is limited in the text. In Active Mechanical investigation, Laly et al. Banana backbone [13] have examined polyester reinforced composites along with found that the optimum at ease of banana backbone is 40%. The mechanical properties of the complexes of banana fiber cement and mechanically physical investigated through Corbiere-Nicollier et al.

(ii) In the composites of coconut fiber reinforced

A lot of features of the use of coir backbone as support in polymer-matrix complex materials are described in the text. Coir is abundant, versatile, renewable, inexpensive in addition to biodegradable lignocelluloses backbone used to construct a wide variety of products [14]. Coconut backbone has also been checked as a filler or different reinforcement composites [14-17]. Furthermore, represents a non-food agribusiness as an additional feedstock (agribusiness and food industry waste) to be considered as raw materials for the formulation ecocompatible complex. Coir is the almost everyone fascinating goods as it has the lowest thermal conductivity along with collection density. The coir adding together reduces the thermal conductivity of the composite fabric specimens and produced lightweight manufactured supplies. Expansion of combined materials for buildings with natural fibers such as coconut fiber through small thermal Conductivity is an fascinating alternative to explain environmental along by the concerns of energy [18, 19]. Geethamma et al. [20] have studied the dynamics mechanical behavior of natural rubber and reinforced composites short coconut fibers. Coco backbone composites were tested as polyester hulls such as ceilings with mailboxes [21].

These composites, loaded coir ranging from 9 to 15% by weight, have a flexural strength of about 38 MPa. Composites of coir-polyester treated and untreated fibers of coir fiber loading and 17 wt% were experienced in tensile, flexural with notched Izod force [22]. The outcome obtained among the untreated fibers explain clear with signs of the presence of a long weak interface Output drawn resin without any fibers adhering to the fibers along with low mechanical Properties were finded. While showing a improved mechanical performance,composites with treated fibers current, however, simply a moderate boost the values of the mechanical properties analyzed. Alkaline treatment is also reported for coconut fibers [23].

2.1 Objectives of the Research

The assignment objectives are explained below.

• Develop a new class of polymer composites natural backbone based explores the potential of coconut fiber.
• To study the result of backbone length on the mechanical performance of coir base composites reinforced epoxy.
•Valuation of the mechanical properties such as tensile power, flexural power, tensile modulus, micro-hardness, along with force resistance, etc.

3. MATERIALS AND METHODS

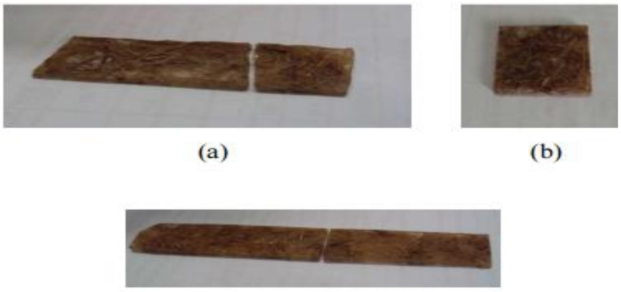
3.1. Sample preparation

The manufacture of a variety of compound materials is carried out from side to side the hand lay-up technique. Short coco coconut fibers (Figure 2) reinforcing LY 556 epoxy resin is second-hand chemically belonging to the family 'epoxy' as the matrix textile. Its general name is bisphenol. The curative epoxy resin at small temperature (Araldite LY 556) as well as the corresponding hardener (HY951) are mixed in a fraction of 10: 1 by mass as recommended. The epoxy resin furthermore hardener are supplied by Ciba Geigy Ltd. Coconut fiber India fiber obtained from the rural region of Orissa situated in India.

Figure 2. Coconut coir fiber

3.2. Mechanical Testing

After fabrication of the test sample were subjected to a variety of mechanical examination according to ASTM standards. The tensile test in calculation to three-point bending test composite materials was carried out using Instron 1195. Tensile testing is generally conducted on flat samples. A uniaxial load is applied across both ends. The ASTM standard investigation method for tensile assets of resin backbone compounds has the description D 3039-76. Micro hardness depth is performed using a Levitz micro resistance tester. A lozenge indenter, in the figure of a straight pyramid with a square base as well as an angle of 1360 between differing faces, is forced into the material below a weight F. The two diagonal X with Y of the left indent in the substance surface after elimination of the weight is measured and L is planned arithmetic point out. In the current learning, the load considered F = 24.54N. Low speed instrumented impact tests are conducted on composite specimens. The tests are performed according to ASTM D 256 standard using a gauge impact. The Charpy impact testing machine was used to measure impact resistance. Figure 3. shows the samples analyzed for impact test, hardness test and tensile strength test respectively. Figure 3 shows the experimental setup and loading arrangement for the test specimens three-point bending.



(a) (b) (c)

Figure 3 Tested specimens

3.3. Scanning electron microscopy (SEM)

The scanning electron microscopy is mention of figure 4. JEOL JSM-6480LV (Figure 4) was used to classify the morphology of the fracture tensile strength of the composite samples. The surfaces of composite specimens scans were directly examined electron microscope JEOL JSM-6480LV. Samples were washed, cleaned thoroughly air dried and coated with 100. Broad platinum sputtering JEOL ion coater with practical SEM at 20 kV. similarly composite trials are mounted part of a set with silver paste. To develop the conductivity of the taster, a thin platinum film is vacuum-evaporated on them before Photomicrographs were taken.

Figure 4. SEM Set up

4.CONCLUSIONS

This experimental investigation of the mechanical behavior of coir reinforced epoxy compounds leads to the subsequent conclusions:

- This effort explain that the successful fabrication of a coconut fiber reinforced epoxy compounds with different lengths of fiber is possible with the single coat lay-up technique.
- It has been observed that the mechanical material goods of the complex such as micro resistance, tensile power, flexural force along with impact strength, etc., composite materials are also influenced by fiber lengths.
- Study of the fracture surfaces of composite fiber reinforced epoxy coconut after the tensile analysis, has been experienced for flexural and impact

experiment. From This study concluded that poor interfacial bonding is responsible for the low mechanical properties.

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