Influence of Pretreatment on Mechanical properties of Bio waste
Eggshell Composite
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ABSTRACT
Manufacturing and evolution of complimentary operated engineering materials from unwanted substances has gained worldwide engrossment. The materials made from bio waste can able to get over the synthetic material due to their isolated properties like inexpensive, non-toxic, non-abrasive, biodegradable, pollution emission free and ecofriendly. The Calcium Carbonate rich egg shell causes serious environment hazards. Effort has been made to incorporate these bio waste egg shell materials into the matrix which form composites to boost up the mechanical properties. So the objective of this study is to make composites which should have a good compressive strength as well as low density. Most of the researchers emphasizes towards the making of light weight material which are significant to automobile, aerospace, electronics industries. Now special care has been increased gradually in the composite industries to make it greater potentiality of application in the field of medicines, chemical industries, and marine and also for household things. Keeping these requirements into mind, the present investigation is mainly focused on the mechanical properties of egg shell reinforced composites. Chicken egg shell were collected, washed with deionized water to remove the inner layer membrane, then dried and powdered. X-ray diffractometry (XRD) and Field Emission Scanning Electron Microscopy (FESEM) were used to characterize the crystalline size, constituent compounds and surface morphology respectively. The internal adhesion between the surface of reinforcement and matrix (Lapox) was enhanced by doing the chemical treatment of egg shell with NaOH solution. The composites were made by hand lay up technique. Three sets of modified (NaOH treated) and unmodified (Raw) samples were prepared for the flexural tests. Result shows the enhancement of mechanical properties with increase in NaOH concentration.

Keywords: Chicken egg shell, NaOH solution, Lapox, Flexural strength
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Objectives
- Transformation of Bio-waste Eggshell into potential use.
- Conversion of Hydrophilic Eggshell into Hydrophobic to make compatible with polymer.
- Enhancement in Mechanical Properties of Eggshell Composite.

Why Egg Shells (ES)?
- It is a bio waste agricultural product. Calcium rich ES protects our bones.
- Alleviates joint pains.
- Nutritious.
- Treat skin irritation.

Composite Fabrication

Hand Lay-up process was adopted.

The thermosetting Epoxy (L-12) resin used as matrix and Hardener (K-6) used as a catalyst.

Initially, the resin was mixed with filler and placed under a resin compatibility probe to make the solution clear.

Then the Hardener was mixed to accelerate thewhole process.

A mould of (100x70x5)mm3 was prepared using glass slides on a plastic sheet and a heavy silicon spray was used inside the mould for easy removal of composite.

The solution was poured into the mould and a roller used to press roll over the surface for removal of air bubbles properly and the moulded composite was held for 24 hrs.

The 4 sets of composites were cut according to ASTM standard for testing in flexural strength.

Characterization Techniques

- X-Ray Diffactometer
- Fourier Transform infrared (FTIR) spectrum
- field emission scanning electron microscopy (SEM)

Future Scope and Conclusion

- Composite were prepared by fiber treatment with varying concentrations (10%, 15%, 20%) of ES.

XRD and FTIR data confirmed the pure Calcite phase in ES filler. Significant difference between crystalline size of treated and untreated ES fillers. The 10% NaOH treated ES filler showed highest crystalline size.

- Incorporation of fillers into epoxy increased flexural strength of composite and improved workability. 10% NaOH treated ES reinforced Composite showed better flexural result.

- Future trends of making composite has been shifted from traditional to natural because of biodegradability and eco-friendly nature.

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