

(12) PATENT APPLICATION PUBLICATION

(19) INDIA

(22) Date of filing of Application :10/03/2025

(21) Application No.202541021271 A

(43) Publication Date : 21/03/2025

(54) Title of the invention : Experimental Study on the Mechanical and Thermal Properties of Basalt Fiber and Nanoclay Reinforced Polymer

(51) International classification	:C08J 5/04, B82Y 33/00, C08L 101/16, C08K 3/04	(71)Name of Applicant : 1)G ASHWIN PRABHU Address of Applicant :No. 11, Thirumagal Nagar, II Street, Karthick Avenue, Flat No. F1, First Floor, "Sai Guru Apartments", Chitlapakkam ----- -----
(86) International Application No	:NA	2)Dr. K. M. ARUNRAJA Address of Applicant :Associate Professor, Department of Mechanical Engineering, Shree Venkateshwara Hi-Tech Engineering College, Gobichettipalayam, Erode 638455, Tamil Nadu, India ----- -----
Filing Date	:NA	3)Mr. RAJESHWARAN R Address of Applicant :Assistant Professor, Department of Civil Engineering, St. Peter's Institute of Higher Education and Research, Chennai 600054, Tamil Nadu, India ----- -----
(87) International Publication No	: NA	4)Dr. D. SRINIVASAN Address of Applicant :Associate Professor, Department of Mechanical Engineering, Loyola Institute of Technology, Palanchur, Chennai 600123, Tamil Nadu, India ----- -----
(61) Patent of Addition to Application Number	:NA	5)Dr. J PAUL CHANDRA KUMAR Address of Applicant :Associate Professor, Department of Mechanical Engineering, Jeppiaar Engineering College, Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai 600119, Tamil Nadu, India ----- -----
Filing Date	:NA	6)Dr. SAGAR PARUTHI Address of Applicant :Assistant Professor, School of Architecture and Design, K. R. Mangalam University, Sohna- Gurgaon Road, Sohna Rural, Gurugram 122103, Haryana, India ----- -----
(62) Divisional to Application Number	:NA	7)Ms. NEHA SHARMA Address of Applicant :Assistant Professor, Department of Civil Engineering, DPG Institute of Technology and Management, Sec-34, Behind Marble Market, Near Hero Honda Chowk, Gurugram 122001, Haryana, India ----- -----
Filing Date	:NA	8)Dr. C. B. SEKAR Address of Applicant :Assistant Professor, Department of Mechanical Engineering, Meenakshi College of Engineering, West K. K. Nagar, Chennai-78, Tamil Nadu, India ----- -----
		9)Mr. C. CHELLADURAI Address of Applicant :Assistant Professor, Department of Mechanical Engineering, Erode Sengunthar Engineering College Thudupathi, Perundurai, Erode 638057, Tamil Nadu, India ----- -----
		10)Dr. T. LAWANYA Address of Applicant :Assistant Professor (Sg), Department of Mathematics, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Thandalam, Chennai 602105, Tamil Nadu, India ----- -----
		11)Mr. G. M. PRADEEP Address of Applicant :Assistant Professor, Department of Mechatronics Engineering, Velammal Institute of Technology, Panchetti, Tiruvalur 601204, Tamil Nadu, India ----- -----

(57) Abstract :

This experimental study investigates the mechanical and thermal properties of basalt fiber and nanoclay reinforced polymer composites, with a focus on their potential for industrial applications. The primary objective of this work is to develop a composite material that combines the inherent benefits of basalt fiber and nanoclay to enhance the performance of polymers in various engineering fields. Basalt fibers, derived from volcanic rock, are known for their excellent mechanical strength, thermal resistance, and environmental sustainability. Nanoclay, on the other hand, is a nanomaterial that can improve the properties of polymers due to its high surface area and exceptional interaction with the matrix. In this study, basalt fibers of varying lengths and nanoclay concentrations were incorporated into a polymer matrix, and the composite samples were fabricated using a standard molding process. The mechanical properties, including tensile strength, flexural strength, and impact resistance, were evaluated using ASTM standard test methods. The thermal behavior of the composites was assessed using differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA), which provided insight into the material's heat resistance, thermal stability, and degradation patterns. The results showed significant improvements in both mechanical and thermal properties of the polymer matrix upon the incorporation of basalt fiber and nanoclay. The tensile strength and impact resistance of the composite material increased by a notable margin, while the thermal stability and degradation temperature were enhanced compared to the pure polymer. The findings suggest that basalt fiber and nanoclay reinforced polymer composites hold significant promise for applications in industries such as automotive, aerospace, and construction, where high-performance materials are crucial. This innovation could lead to the development of eco-friendly, cost-effective composite materials with superior mechanical and thermal properties, offering substantial advantages in both product performance and environmental sustainability. A utility patent for this composite material is proposed based on these novel findings.

No. of Pages : 26 No. of Claims : 10