

Effect of Chemical Treatments on Mechanical Properties of Jute

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Abstract

These days, environmental issues are of great importance on a global scale. Carbon dioxide (CO₂) gas is typically released during the manufacturing and use of traditional metals, metal-based alloys or synthetic materials. For this reason, the use of bio-composite materials is increasing day by day in order to reduce the consumption of traditional metals, metal-based alloys or synthetic materials as bio-composite materials have less influence on the environment and they are biodegradable and eco-friendly. In this regard, environment-friendly materials like jute are of particular relevance. Jute is one of the most significant natural fibers that is found in large quantities in Bangladesh and it has been used for a variety of purposes. Similarly, like other natural fibers, jute fibers also have high moisture absorption qualities, which results in poor adhesion properties with the matrix and degraded material strength. Over the years, various methods have been used to improve moisture absorption ability and fiber to matrix adhesion properties. Among various methods, chemical treatment is the most widely used method. Chemical treatments can be considered for modifying the properties of jute fibers. It can increase the interface adhesion between the jute fiber and the matrix. It can also decrease the water absorption of fibers. Yet most chemical treatments have achieved various levels of success in improving jute fiber's strength, fiber fitness and fiber-matrix adhesion. Therefore, the goal of the current study is to understand how chemical treatment affects the mechanical properties of jute fiber.

Keywords

Jute, Chemical treatment, Bio-composite and Mechanical properties.

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Biographies

Shimanto Sarker is an Undergraduate Mechanical Engineering student at Ahsanullah University of Science and Technology (AUST). Beside study he is the Sub-Executive Member of AUST Robotics Club and Executive member of ASME AUST student chapter. He became the 2nd Runners up of HULT Prize at AUST 2021 and participate HULT Prize Kuala Lumpur Impact Summit 2021 and this year became the 1st Runner up of case competition at RESOLUTE 1.0. He is also an expert of 3D CAD design (certified by Dassault Systems CSWA) and have fluent working knowledge of MATLAB and Ansys. Besides all these he has also experience to work with couple of remarkable projects.

Dhruba Dhar is currently an Undergraduate Mechanical engineering student at Ahsanullah University of Science and Technology (AUST). Aside from studying, he is the member of AUST Innovation and Design Club (IDC). He participated in Resonance 2019 competition, at Islamic University of Technology, Gazipur, Dhaka. He is an expert in SOLIDWORKS, Ansys and MATLAB.

Zayed Faysal Revan is an Undergraduate Mechanical Engineering student at Ahsanullah University of Science and Technology (AUST). He is also a member of AUST Innovation and Design Club (IDC). He was a Social Representative of AUST Society, right now, he is the candidate for General Secretary selection. He is skilled in SOLIDWORKS and MATLAB.

Md. Ershad Khan is an Associate Professor in Textile Engineering under the department of Textile Engineering (TE) at Ahsanullah University of Science and Technology (AUST), Dhaka, Bangladesh. He has 16 years of professional experience in several industries as well as academia. He has completed his B.Sc. in Textile Technology and M.Sc. in Textile Engineering degree from Bangladesh University of Textiles (BUTEX). He is currently pursuing his Ph.D. in Chemistry from Bangladesh University of Engineering and Technology (BUET). He was former member of Society of Dyers and Colorists (SDC, UK) and American Association of Textile Chemists and Colorists (AATCC). He is an active member of the Institution of Engineers, Bangladesh (IEB). He has authored a book titled 'Technology of Denim Manufacturing'. Moreover, He has a good number of research articles published in various Journals and conference proceedings. His research interests include sustainable textile processing, smart textile materials, antimicrobial textiles, composite materials.

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