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Enhancing the Softness of Bamboo Fabric as a Sustainable Material through Silicon-Based Modifications

Shaimaa A Kamel
Lecturer, Faculty of Applied Arts, Tanta university, shaimaakamel05@gmail.com

Abstract:

One of the biggest advantages of bamboo is that holds the title of the fastest-growing woody plant on Earth, surpassing even the fastest-growing tree species. Certain bamboo varieties are capable of growing an impressive 1 meter per day. This material is an excellent replacement for synthetic fibers derived from petroleum-based compounds, which are becoming scarce. It also offers a viable alternative to natural fibers, whether plant-based or animal-derived, that is experiencing production limitations. The world is increasingly adopting eco-friendly materials, with bamboo standing out as the fastest-growing woody plant on Earth. Widely cultivated in Asia, bamboo serves as a versatile, renewable resource for various functional and decorative products. As awareness of environmental issues and personal health rises, eco-conscious fabric production is in demand. Bamboo fabric, known for its softness, drapability, and pesticide-free cultivation, is a sustainable option. This study involved treating bamboo fabrics with silicone compounds to assess their impact on various mechanical properties, including durability, moisture absorption, stiffness, weight loss, and overall performance. The results of this study indicate that bamboo fabrics can play a significant role in the textile industry as a replacement for petroleum-based or synthetic fabrics, helping to protect the environment. Additionally, bamboo serves as a viable alternative to traditional natural fabrics. The research shows that when treated with various concentrations of silicone compounds (PDMS), bamboo exhibits enhanced qualities, including increased softness, improved fabric strength, and hydrophobic characteristics.

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