

Mechanical Properties of Organic Polymer and Exfoliated Graphite Reinforced Bacteria Cellulose Paper

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Abstract : Bacterial Cellulose (BC) is a structural organic compound produced in the anaerobic process. This material can be a useful eco-friendly substitute for commercial textiles that are used in industries today. BC is easily and sustainably produced and has the capabilities to be used as a replacement in textiles. However, BC is extremely fragile when it completely dries. This research was conducted to improve the mechanical properties of the BC by reinforcing with an organic polymer and exfoliated graphite (EG). The BC films were grown over a period of weeks in a green tea and kombucha solution at 30 °C, then cleaned and added to an enhancing solution. The enhancing solutions were a mixture of 2.5 wt% polymer and 2.5 wt% latex solution, a 5 wt% polymer solution, a 0.20 wt% graphite solution and were each allowed to sit in a furnace for 48 h at 50 °C. Tensile test samples were prepared and tested until fracture at a strain rate of 8 mm/min. From the research with the addition of a 5 wt% polymer solution, the flexibility of the BC has significantly improved with the maximum strain significantly larger than that of the base sample. The addition of EG has also increased the modulus of elasticity of the BC by about 25%.

Keywords : bacterial cellulose, exfoliated graphite, kombucha scoby, tensile test

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