

**Title** – Enhancing the Mechanical Properties Bacteria Cellulose using Fiber and Plasticizer Reinforcement

**Program of Study** – Mechanical Engineering

**Presentation Type** – **Choose one of the following:** Physical Poster

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**Abstract:** Bacterial Cellulose (BC) is a structural organic compound produced by aerobic bacteria. It is biodegradable, have a certain degree of crystallinity and absorbs water significantly. It has been used as electronics, and biomedical devices. There is also interest to use BC for cellulose based clothing and green composites. Although BC has high wet mechanical strength, dried BC is weaker, extremely brittle and have very low mechanical property. Many of the mechanical properties of BC such as tensile strength, Young's modulus of elasticity, and ductility are not sufficiently high for many applications involving mechanical load. This research focuses on developing methods of improving various mechanical properties such as tensile strength and toughness of BC using reinforcements. In order to maintain the greenness of BC, plant fibers and natural plasticizers are used to reinforce the BC. First, the BC paper was prepared by polymerizing glucose into a long and unbranched chain using kombucha scoby as the starter culture in an incubator at around 25 °C. Two equal sized BC sheets are then cut and placed together face to face, sandwiching the reinforcements. The samples are then placed in a furnace to dry and fuse together. It is found that the addition of plasticizers enhanced the

ductility of the BC significantly. Mechanical tests will be conducted to determine the tensile strength and elastic modulus improvement from the fiber/plasticizer reinforcement.