Exploration of Bio-Textiles for a Sustainable Fashion Industry

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The fast fashion industry devastates the environment and garment workers in the Global South. Each year, 92 million tonnes of textile waste is deposited in landfills, equivalent to dumping a truckload of clothing every single second. Approximately 64% of the textiles used today contain per- and polyfluoroalkyl substances (PFAS), chemicals that are highly dangerous to humans and the environment. Biotextiles offer an innovative sustainable fashion alternative. After failed experimentation with mycelium, a root-grain fungi, the focus shifted to SCOBY, Symbiotic Cultures of Bacteria and Yeast, used to brew kombucha. When the SCOBY fed on the “starter,” a combination of tea, sugar, and residual kombucha, a thin layer of bacterial cellulose called a pellicle grew on the surface. This pellicle was dried and manipulated into a bioleather. When testing water resistance, two samples—one with cornstarch and one without—were tied to two 50 mL beakers. 0.5 mL of tap water was placed in the center of each beaker on top of the material. After three trials, 0.0 mL of water leaked through either sample into the beaker and instead evaporated or soaked into the material. The cornstarch variation remained the same texture after drying, however, the no-cornstarch variation became tacky. This current material was successfully sewn into a three-pocket wallet, however, further improvements must be made to ensure complete water resistance and long-term durability. Biodegradable and regenerative kombucha textiles have the potential to transform the fashion industry while also addressing 12 of the 17 United Nations Sustainable Development Goals.

Awards Won: