



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

<b>Name(s)</b>  <b>Aziza Mohammed</b>	<b>Project Number</b>  <b>J1315</b>
<b>Project Title</b>  <b>Investigating Kombucha Biofilm as an Alternative for Other Flexible Materials</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> The goal of my experiment was to determine if Kombucha Biofilm can replace other commonly used flexible materials. Materials created by microbes have the potential to be used in manufacturing goods. Such materials require less energy to produce and provide higher biodegradability than traditional plastics. In the future, such materials can be bio-engineered to be stronger than non-renewable materials thereby reducing the carbon-footprint of manufactured materials. Kombucha Biofilm is a flexible material created by microbes that can be produced from renewable waste sugar sources without requiring additional energy. Can Kombucha Biofilm replace other flexible materials in common applications?</p> <p><b>Methods</b> Kombucha Biofilm was cultured using sugar water, black tea, and a starter Kombucha culture containing bacteria and yeasts at room temperature. The resulting Kombucha Biofilm sheets were dried. Tests such as tensile strength, iodine permeability and oxygen permeability were performed to compare the usability of Kombucha Biofilm as a potential replacement for other flexible materials.</p> <p><b>Results</b> Kombucha Biofilm had a higher tensile strength and ability to prevent oxidation than commonly used shopping-bag plastic, but not cloth or leather. In addition, it did not let iodine reach the starch in the iodine permeability test, as did the leather and plastic. However, cloth immediately let the iodine reach the starch. Kombucha biofilm absorbed the most water, which could be a disadvantage for use in common applications.</p> <p><b>Conclusions</b> Under dry conditions, Kombucha Biofilm is an effective flexible material that can replace other flexible materials. However, under wet conditions, Kombucha Biofilm absorbs moisture from air and its texture changes. Due to moisture absorption, Kombucha Biofilm cannot be used as replacement for commonly used materials. It has potential for use in specialized applications such as medical bandages.</p>	
<b>Summary Statement</b>  Kombucha Biofilm shows partial viability for use in common applications with potential for use in specialized applications.	
<b>Help Received</b>  None, I conducted the experiments myself.	