



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2018 PROJECT SUMMARY**

<b>Name(s)</b> Nathaniel S. Shin	<b>Project Number</b> <b>J0620</b>
<b>Project Title</b> <b>Using Silicone Caulk and Turpentine to Create a Novel Hydrophobic Coating by Utilizing Silica Nanoparticles</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Micro/nanostructuring a surface has been proven to amplify its hydrophobic tendencies. Considering the role of nanostructures in hydrophobicity, I attempted to create a water-based stain repellent with silica nanoparticles by dissolving silicone caulking into turpentine in various concentrations.</p> <p><b>Methods/Materials</b> Using a warm water bath and vortexer, silicone and turpentine were mixed in a scintillation vial to create a novel compound capable of repelling water. Hydrophobicity was determined by measuring the absorption of a fixed volume of water delivered through a transfer pipet onto cotton swatches treated with turpentine only, or 0, 1, 2, 3 or 4 g/ml of solution. The amount of absorption was compared across concentrations using GraphPad Prism statistical software.</p> <p><b>Results</b> Each concentration of silica was dissolvable in turpentine after heating and vortexing. Although the 3g/10mL concentration repelled all of the water, statistical analyses showed that each group proved to be equally effective as a hydrophobic barrier relative to both the negative control and the turpentine only groups.</p> <p><b>Conclusions/Discussion</b> In addition to reaffirming the role of nanostructures in hydrophobicity, the present study shows that all of the concentration groups exhibited a degree of hydrophobicity. Furthermore, the results suggest that 1g/10mL is the most cost efficient concentration without compromising effectiveness.</p>	
<b>Summary Statement</b> Inspired by structural hydrophobicity in nature, I created a hydrophobic coating using silica nanoparticles and found a concentration of 1g/10mL provided the most cost efficient protection without compromising effectiveness.	
<b>Help Received</b> I received assistance in borrowing some equipment as well as help understanding the statistical analysis of data from Mr. Don Shin. My science teacher helped me understand the scientific method and the conduct of a scientific investigation.	