The Synthesis and Oil Absorption Properties of Hydrophobic Silica-Based Aerogels by Varying Methods of Functionalization

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As the demand for oil continues to rise, the number of oil spills that wreak havoc in ocean ecosystems also increases. Because this issue affects many natural habitats and resources, a cost effective and efficient way to remediate oil spills caused by off shore drilling is needed. The porous structure, low density, and oil absorption capacity of hydrophobic aerogels make them optimal materials for this purpose. In this project, surface and core modified aerogels were produced via a new procedure that incorporates different aspects of preexisting methods. The three types of hydrophobic aerogels were synthesized using different silanes and synthesis procedures. The hydrophobicity and oil absorption properties of the products were then compared and analyzed. It was found that as the molecular size of the silane increases, so do the hydrophobicity and oil absorption properties for the core and surface functionalized aerogels. However, this is not true for the surface modified aerogels; the trimethylchlorosilane surface modified aerogel was the most effective at absorbing oil.