



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

Name(s) Jenna Kim; Akemi Zollinger	Project Number J2113
Project Title The Effect of Hydrogels on Stain Removal	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our objective for this project is to conduct an experiment to determine whether polyacrylamide hydrogels are able to act as a stain removing vehicle when tested against different types of stain-causing agents.</p> <p>Methods/Materials 150 polyacrylamide hydrogels, pomegranate juice, soy sauce, coffee, marinara sauce, and olive oil, 100% cotton t-shirts, distilled water, Oxi-Clean Stain Remover, wax paper, plastic wrap, baking sheets, beakers, paper towel roll, pipettes, plastic spoons. Our experiment was divided into two phases: 1) release of the loaded solution onto stain and 2) release and absorption of solution through the stain. In each phase, there were 10 trials per stain.</p> <p>Results As shown in our results, hydrogels were capable of removing stains. Both phases showed that pomegranate stains were the easiest to remove and olive oil stains were the hardest, as they showed no signs of stain removal throughout the experiment. In Phase 1, the water and Oxi-Clean loaded hydrogels worked the best with the pomegranate stains and the worst with the olive oil stains. However, in Phase 2, the dry hydrogel crystals taped on the back in addition to the loaded ones on top were able to let the absorbed substances pass through the stain, allowing the dry hydrogels to help the water-loaded hydrogel, but have little effect on the Oxi-Clean loaded hydrogel.</p> <p>Conclusions/Discussion Overall, fruit stains and water-based, hydrophilic stains could be best removed by either of the hydrogels. Hydrophobic and oil-based stains were not able to be removed because the level of pH at which the hydrogel is triggered to absorb and release was at a neutral pH of 7, or water. The special characteristics of these hydrogels that allowed it to remove the stain could not be functional with pHs lower than 7 (bases), meaning that the mainara and olive oil stains could not be removed. In conclusion, hydrogels are capable of removing stains because of their abilities or absorb and release liquids, and most effectively remove hydrophilic stains as opposed to hydrophobic stains.</p>	
Summary Statement In our project we took advantage of the unique properties of hydrogels to absorb and release liquid substances and tested them to see if they can remove different types of stains.	
Help Received We designed the experiment ourselves and our science teacher reviewed our project.	