



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

Name(s) Luke A. Pannell	Project Number 38578
Project Title Projectile Protection: Deflective Properties of Non-Newtonian Fluids	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project was designed to test whether various mixtures of non-Newtonian fluids would deflect small projectiles.</p> <p>Methods/Materials A fixed slingshot was used to propel ¼ inch metal pellets into a sandbag target 9.91 meters away. A thin baggie was filled to a 4mm thickness of each mixture and placed as a shield against a sandbag, held by a layer of cotton jersey. Ten different combinations of oobleck, slime, polyethylene glycol, and silica were tested, with water being the control.</p> <p>Results Eight of the mixtures did not stop the projectile, which broke through the baggie entirely and lodged into the sandbag. However, two mixtures of silica particles suspended in slime deflected the shot, which partially punctured the baggie but bounced off the target and into the grass. Experiment was repeated several times with identical results.</p> <p>Conclusions/Discussion The slime/silica combination performed the best, which was unexpected. Perhaps the polymers in the slime aided spring in some way. Such a property could be explored further for the manufacture of flexible body armor.</p>	
Summary Statement I discovered that a suspension of slime and silica nanoparticles deflected metal shots traveling at 800 feet per second.	
Help Received I mixed, ground and prepared all the mixtures. My dad supervised my set-up and the firing of the projectiles.	