



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jacqueline Prawira</b>	<b>Project Number</b> <b>J0626</b>
<b>Project Title</b> <b>Coffee-Doh Battery: Boosting the Power of an Enviro-Battery Using Coffee's Acidity in Homemade Conductive Dough</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Coffee-Doh battery is an enviro-battery created by combining 3 concepts: the acidity property of spent coffee grounds (SCG), homemade conductive dough and electrolysis. The objective is to prove that adding SCG can boost the voltage and current produced in homemade conductive dough (or Coffee-Doh) and to discover that Coffee-Doh can generate power with the presence of cathode-anode; resulting in Coffee-Doh Battery.</p> <p><b>Methods/Materials</b> Coffee-Doh = spent Coffee grounds (SCG) + homemade conductive dough Coffee-Doh Battery = Coffee-Doh + (cathode and anode) I conducted six preliminary phases prior to Coffee-Doh Battery testing. The experiment procedures were: 1. Developed Coffee-Doh recipes (control: homemade conductive dough #17) 2. Tested different ratios of SCG in the Coffee-Doh (0%, 12.5%, 25% and 37.5%) 3. Tested different amounts/weight of Coffee-Doh (50g, 75g, 100g, and 150g) All tests performed in 3 trials and compared to control; using multi-meter to measure the amount of voltage, current and power generated, with the same cathode-anode combination (C and Mg). Further testing/Applications were conducted to power up LCD clock, whistle chip and 5 different LED lights by comparing: 1) three different recipes of Coffee-Doh Batteries, 2) the performance of Coffee-Doh Battery to typical enviro-batteries. All tests were performed in 1, 2, and 3 cells connected in series. The levels of power, loudness and brightness were observed.</p> <p><b>Results</b> Voltage, current and power increased as the ratio of SCG and the amounts/weight of Coffee-Doh increased. However, too much SCG will not form a Coffee-Doh. A good Coffee-Doh recipe must have flour (no less than 62.5% in weight) and SCG (no more than 37.5% in weight). Lower voltage anomalies were found and sources of errors were addressed. Coffee-Doh Battery successfully powered up LCD clock, whistle chip, and 5 different LED lights and its performance exceeded typical enviro-batteries.</p> <p><b>Conclusions/Discussion</b> My hypothesis was proven that the acidity property of SCG caused more chemical reaction (oxidation) to happen and boosted the voltage, current and power produced; creating a Coffee-Doh Battery with the presence of cathode-anode. Coffee-Doh Battery is an example of a hands-on school project that involves students in the process of learning and inspires creativity. It can help reduce the regular battery usage and waste in small school projects.</p>	
<b>Summary Statement</b> Coffee-Doh Battery is proven as an enviro-battery that not only performs better than the typical enviro-battery, but also can be beneficial in promoting students' science learning and creativity.	
<b>Help Received</b> My parents were my mentors and supervised this project.	