



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Dennis Chen</b>	<b>Project Number</b> <b>J2109</b>
<b>Project Title</b> <b>The Effects of Thermal Interface Material (TIM) on Computer Performance</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The goal is to test how computer performs with different thermal interface materials that can be used as part of computer cooling system. With the advent of smart phones and tablets, personal computers have become less popular. As a result, businesses and individuals have found cloud and super-computing more effective because of its information sharing and accessibility. In the super computer environment, the requirement for a high performance silicon has increased significantly, and so does the requirement of high performance computer cooling systems or thermal interface materials.</p> <p><b>Methods/Materials</b> This experiment is to test four different thermal interface materials for an i386-based processor (P68), and record its speed and reliability. These four thermal compounds include diamond powder, ceramic solution, silicon solution, and a pure metal compound. Before starting the experiment, it was theorized that if thermal pastes of different varieties were tested on a Prescott P68 silicon die, one would find that the metal compound would help improve the performance of a silicon die at similar operating temperatures because it is known to produce the lowest temperatures, which leaves more headroom for increased performance.</p> <p><b>Results</b> The test result showed that the ceramic paste was the best material with a 10% increase in computer performance compared to metal compound, which is contradicting to the conventional belief that the computer performs better at a lower temperature with a good thermal interface. As a result, there remains a question of how silicon degrading is effected by temperature and thermal properties.</p> <p><b>Conclusions/Discussion</b> This experiment demonstrates that the computer performance can be effected by the thermal interface material used as part of the cooling system. Changing to a better thermal material such as ceramic compound will improve the computer performance.</p>	
<b>Summary Statement</b> This experiment is to test how computer performs with four different thermal interface materials that can be used as part of the computer cooling system.	
<b>Help Received</b>	