



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Mark D. Langer	Project Number J1118
Project Title What Factors Make the Brightest and Longest Lasting Light Bulb?	
Abstract Objectives/Goals Objective: My project was to find the factors that make up the brightest and longest lasting light bulb. Methods/Materials Materials and Methods: Steel, carbon, and copper were chosen as the three filaments. Those three filaments were tested with a twelve-volt battery charger to see how long they lasted, and the length of time they glowed was recorded. Next, steel filaments were tested to find if the length of the filament made it glow longer. (Copper was not used because it did not last long at all.) The brightness of steel, copper, and carbon filaments was also compared. The filaments were set up in a dark place and a camera was focused on it. The camera's F-stop was set on four and when the filament was turned on, the shutter speed needed for a proper exposure was measured. After that, carbon and steel were tested in different atmospheres: normal air, a vacuum, and in argon. These results were measured and recorded. Results Results: Carbon worked the best when in argon. It was very bright and it lasted so long we finally just stopped timing it. Steel lasted a long time, but not as long as carbon. Steel was also not as bright as carbon. Copper the least bright and shortest burning filament. Conclusions/Discussion Discussion: Carbon and steel were the best filaments. Carbon was the best filament overall, but it was hard to work with because it only came in set sizes. A five-inch long piece was tried but it was too thick to work, it only smoked. Steel worked well mainly because it lasted so long and was easy to work with. Copper did not work well as a filament but it was very easy to work with. It lasted the best at twelve inches long, but it was not bright at all. The shape of the filament was also tested, whether wound or straight, but it did not make a big difference in the lasting brightness of the filament. The best atmosphere was argon. The vacuum might have worked better if we had a vacuum pump instead of a water aspirator to make the vacuum.	
Summary Statement My project showed what materials and conditions make a good filament for a light bulb.	
Help Received I used equipment at Loma Linda University under the supervision of Dan Rogstad and Katie Noyes (graduate students). My Dad helped me work with the filaments and the battery charger.	