CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
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Project Number
J0721

Project Title
What Is the Effect of Temperature on the Output of Semiconductor Diodes?

Abstract

Objectives/Goals
Has one ever wondered why a calculator that has been left in a car out in the sun does not work, whereas the same calculator when cooled to room temperature works again? The conductor of this experiment wanted to get to the root of this question and thus the topic how will temperature affect the output of a semiconductor diode?

Methods/Materials
The apparatus of the experiment was a breadboard with a diode and a voltmeter measuring output. The diode was placed on a heating device, which was connected to a variac which was used to control temperature, a thermocouple was used to moderate temperature. Also the diode was placed on ice, which was also connected to a thermocouple.

Results
This project was exactly as predicted the output of the device decreased in a linear fashion as the temperature varied from room temperature. The average output correlated with the average temperature except for a few exceptions. All four diodes had relatively the same output for a given temperature.

Conclusions/Discussion
The experiment did not proceed entirely without problems. The temperatures of the heating pad were never stable, and the instability grew with the temperature thus making testing difficult. Also twice during the experiment wires were displaced and had to be fixed before testing was resumed.
The hypothesis that the change in temperature will be equivalent to the increase in degradation caused by leakage current, was supported. The higher or lower the temperature the diode was exposed to, the greater degradation was present.

Summary Statement
What is the impact of different temperatures on semiconductor diodes.

Help Received
Father helped with the project, Friend helped donate materials, Mother proofread reports