CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)

Adam Sowlati

Project Number

J1537

Project Title

Superconductivity

Abstract

Objectives/Goals

This project is an attempt to understand and learn how superconductors behave. Do magnetic fields affect the electrical resistivity of Type 2 superconductors? This was the question, which was the focus of this project. A second question was later introduced: does the current flowing through the superconductor determine how the magnetic field affects the superconductor's resistivitiy?

Methods/Materials

An electro-magnet was used to expose the superconductor to a magnetic field. Wrapping a roll of magnetic-wire around an iron-bar created the electro-magnet. A four-point electrical probe with a $Bi(2)Sr(2)Ca(n-1)Cu(n)O(9)$ (BSCCO) superconductor was attached to a thermocouple, power supply, ammeter, and a voltmeter. The four-point probe was submerged into liquid nitrogen and retrieved only to expose it to the magnetic fields. The resistance was calculating using Ohms law, which states that resistance, is voltage divided by current. The second part of the project was determined by performing the previous experiment with varying currents flowing through the superconductor.

Results

As the magnetic field increases the resistivity greatens. Also, as the current increases the magnetic field affects the superconductor's resistivity more.

Conclusions/Discussion

The findings of this project are truly fascinating. It has been discovered that magnetic fields do affect superconductors, and that the current flowing through the superconductor determines how the magnetic field affects the superconductor's resistivity. This shows that different types of energies affect superconductors.

Summary Statement

This project toiled with the question of how superconductors are affected by magnetic fields.

Help Received

Used Viewpoint School's lab and equipment under teacher's supervision; Technical questions answered by mentor; Teacher gave advice.