“Work Function Measurements of Graphene”

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Overview

• Introduction
• The Kelvin Probe
• Summary
• Lesson Plan
• Acknowledgements
Introduction

The novel properties of graphene have created an exuberance among scientist as a possible replacement for silicon in the microelectronics industry as it reaches the limits of Moore’s Law. As a result, scientist want to use graphene in electronic devices because of its excellent properties. Thus, the objective of my research project was to investigate one of these properties, the work function of graphene.
Analytical Techniques: The Kelvin Probe

\[ i(t) = \frac{d}{dt} \left[ C(t) \cdot (\Delta U - V) \right] = 0 \]

given by lock-in

\( t > 10...100 \text{ ms} \)
The Kelvin Probe
The Kelvin Probe
Summary

• Before a new layer of graphite was obtained, HOPG had a work function of 5.04 eV on the Kelvin probe.
• A new layer of graphite was obtained on the HOPG sample by exfoliation, adhering a piece of scotch tape on the sample and removing it.
• Afterwards, the sample was placed on the Kelvin probe, displaying a reading of 4.52 eV.
• This reading was taken as the reference work function of 4.50 eV.
• Next, a CVD sample that had been annealed to a temperature of 500 °C was placed on the stage of the Kelvin probe- the CPD adjustment amounted to .38 eV.
• Adding the CPD difference to the reference the work function of 4.90 eV was obtained for CVD sample.
Lesson Plan
The Resistivity of Graphite

By

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Lesson Plan

• Science Article: Carbon Wonderland
• KWL Worksheet
• Main Activity: The Resistivity of Graphite
• Experimental Setup
• Results
• KWL Worksheet
• Rubric
Science in the News
Experimental Setup
STEP-UP Implementation

- Fall/Spring Lesson
- Science Project: Graphite
- Girl Scout Physics Day: Fall 2011
- Engineering Club: Physics Profiles
- Ga Tech Field Trip November (If Available)
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