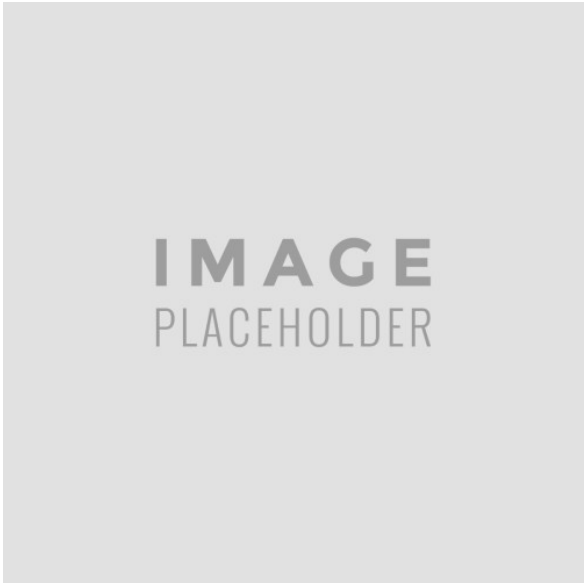
Monash University

Honours Thesis

Thin oxides in graphene devices



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Abstract:

I present a review of the use of graphene in electronic devices, both in its shortfalls and exciting properties. The electronic structure is detailed, along with various scattering sources that affect electron transport and ultimately the goal of room temperature, electronic devices. Considering heterostructures and the use of other materials to enhance graphene, I discuss the potential use of hafnium dioxide, and other oxides, as an excellent gate dielectric material for potential use in graphene field-effect devices.

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Chapter 1

Introduction

Chapter 2

Production & identification of graphene

Chapter 3

Characterisation of graphene

3.1 Resistivity Measurements

3.1.1 Resistance Measurement

Assuming $R_{load} \gg R_{sample}$ then,

$$I_{in} = \frac{V_{\text{SR830}}}{R_{load} + R_{sample}} \approx \frac{V_{\text{SR830}}}{R_{load}} \tag{3.1}$$

To stay within 1% of error, we can make sure that $R_load > 100 \times R_{sample}$.

Consequently, the resistance of the sample between the voltage probes can be calculated:

$$R_{sample} = \frac{V_{A-B}}{I_{in}} \approx \frac{V_A - V_B}{V_{\text{SR830}}} R_{load} \tag{3.2}$$

Chapter 4

Test

Chapter 5

Bibliography