

**EFFECT OF VARIOUS TEMPERATURE ON GRAPHENE BASED  
CONDUCTIVE INK**

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**A report submitted  
in fulfilment of the requirements for the degree of  
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**KESAN PELBAGAI SUHU TERHADAP DAKWAT KONDUKTIF BERASASKAN  
GRAPHENE**

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**Laporan ini dikemukakan sebagai  
memenuhi sebahagian daripada syarat penganugerahan  
Ijazah Sarjana Muda Kejuruteraan Mekanikal**

**Fakulti Kejuruteraan Mekanikal**

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**2020**

## DECLARATION

I declare that this project report entitled “Effect of Various Temperature on Graphene Based Conductive Ink” is the result of my own work except as cited in the references.

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Date : June 2020

## **PENAKUAN**

Saya akui laporan ini yang bertajuk “Kesan Pelbagai Suhu terhadap Dakwat Konduktif Berasaskan Graphene” adalah hasil kerja saya sendiri kecuali yang dipetik daripada sumber rujukan.

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## **PENGESAHAN PENYELIA**

Saya akui bahawa telah membaca laporan ini dan pada pandangan saya laporan ini adalah memadai dari segi skop dan kualiti untuk tujuan penganugerahan Ijazah Sarjana Muda Kejuruteraan Mekanikal.

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## ABSTRACT

The outstanding characteristics of graphene, with its good mechanical and electrical characteristics, have made it one of the best candidates to replace other conductive material when developing conductive ink. Graphene properties and the way to improve it have been researched for a decade. In this study, the development of graphene-based conductive ink and graphene properties was overview in order to understand more about the characteristics of graphene, binders and substrate. Some research was conducted to find a factor that could affect the performance of graphene conductive ink, in order to develop a new idea to improve the production of graphene conductive ink. This study shows that the performance of graphene conductive ink is mostly influenced by the conductive ink structure. While the good surface and structure of the graphene conductive ink depending on the stage of the sample preparation. This is because a lot of errors can occur at that time. For example, the formulation matrix for composition, the temperature for the curing process and patterning and printing method. Such factors may have an effect on the development of conductive ink. Therefore, this study focused more on observing the effect of various curing temperatures in order to produce a good linkage between the binders and the filler and several experiments are also being performed to determine the resistance, voltage and microscopy image of the graphene conductive ink. The study was conduct on three size of sample which is 1 mm, 2 mm and 3 mm and with four difference patterns and was cure under temperature of 90 °C, 100 °C and 110 °C. The outcome show sheet resistivity was lower at 3 mm width and at

temperature of 110 °C. Thus the finding from this study are, sheet resistivity was decrease by increasing the width and the curing temperature for graphene based conductive ink.



## **ABSTRAK**

*Ciri luar biasa graphene, dengan terdapat ciri mekanikal dan elektrik yang baik, menjadikan ia salah satu calon terbaik untuk menggantikan bahan konduktif lain bagi menghasilkan dakwat konduktif. Sifat-sifat Graphene dan cara memperbaikinya telah diteliti selama satu dekad. Dalam kajian ini, penghasilan dakwat konduktif berasaskan graphene dan sifat graphene adalah gambaran keseluruhan untuk memahami lebih lanjut mengenai ciri-ciri graphene, pengikat dan substrat. Beberapa kajian dilakukan untuk mencari faktor yang dapat mempengaruhi prestasi dakwat konduktif berasaskan graphene, untuk mengembangkan idea baru bagi meningkatkan fungsinya. Kajian ini menunjukkan bahawa prestasi dakwat konduktif graphene kebanyakannya dipengaruhi oleh struktur dakwat konduktif. Manakala permukaan dan struktur dakwat konduktif berasaskan graphene yang baik bergantung pada tahap penyediaan dakwat konduktif. Ini kerana banyak kesalahan boleh berlaku pada masa itu. Antaranya ialah, matriks formulasi untuk komposisi, suhu untuk proses pemanasan dan kaedah percetakan. Faktor-faktor tersebut boleh memberi kesan kepada penghasilan dakwat konduktif. Oleh itu, kajian ini lebih memfokuskan kepada pemerhatian kesan pelbagai suhu pemanasan dakwat konduktif untuk menghasilkan hubungan yang baik antara pengikat dan pengisi dan beberapa eksperimen juga dilakukan untuk menentukan rintangan, voltan dan gambar mikroskopi dakwat konduktif graphene. Kajian dilakukan pada tiga ukuran sampel iaitu 1 mm, 2 mm dan 3 mm dan dengan empat corak perbezaan dan dipanaskan pada suhu 90 °C, 100 °C dan 110 °C. Hasilnya menunjukkan rintangan lebih rendah pada lebar 3 mm dan pada suhu 110 °C. Oleh itu,*

*penemuan dari kajian ini adalah, rintangan akan berkurang dengan meningkatkan lebar dan suhu pengawetan untuk dakwat konduktif berasaskan graphene.*

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