CHARACTERIZATION OF IODINE DOPED AMORPHOUS CARBON THIN FILM USING NATURAL PRECURSOR

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Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Industrial Physics
In the Facutly of Applied Sciences
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ACKNOWLEDGEMENT

In the name of Allah, Most Gracefull, Most Mercifull. With my humbleness and gratitude, I would like to thank Allah S.W.T for conferring me with strength and patience to accomplish this thesis succesful completely on the time. I would like to express my deepest thank to my research supervisor Mr. Uzer Mohd Noor and co-supervisor Dr Aniszawati Binti Aziz for the guidance, attention and support for realization of this research. Im also would like to acknowledge my senior Puan Dayana Binti Kamaruzaman whose has given me kind guidance, constructive suggestion and also continous encouragement in a very supportive manner during preparation of this final year project. Not to forget all the seniors and staffs at the Nano-ElecTronic Centre and Nano-SciTech Centre for their technical advises. Last but not least, to my family and friends, who have gave me support when I most needed. Final thanks to all those who have lends a hand and helped me out in completing this thesis in one way or another.

Rais Rahimi Bin Ishak

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July 2013

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ABSTRACT

The amorphous carbon thin films and iodine doping was prepared by thermal Chemical Vapor Deposition (CVD) method onto glass substrate. For amorphous carbon thin film deposition, camphor oil was used as natural carbon source precursor and iodine was used as p-type dopant for doping process. The effects of iodine doping duration from 0 minutes to 30 minutes on the structural, optical and electrical properties for carbon based solar cell applications have been investigated. The iodine doped amorphous carbon thin films were characterized by using Raman spectroscopy and FESEM for structural properties. UV-VIS-NIR spectroscopy and current-voltage (I-V) measurement were carried out for optical and electrical properties respectively.

CHAPTER 1

INTRODUCTION

1.1 Background of study

Carbon is the chemical element atomic number of 6 and it is nonmetallic and tetravalent which make carbon have four electrons available to form covalent chemical bonds. All carbon allotropes are solids under normal condition. This versatile element (carbon) exists in noncrystalline and crystalline forms such as diamond, graphite, carbon nanotubes (CNT), amorphous carbon (a-C) and many more. Carbon is the 15^{th} most abundant element in the Earth's crust and the fourth most abundant element in the universe by mass after hydrogen, helium, and oxygen. The most common oxidation state of carbon in inorganic compounds is +4, while +2 is found in carbon monoxide and other transition metalcarbonyl complexes. Carbon has the highest melting point of all elements, around 3500°C. [1]

Amorphous or also known as non-crystalline solid is a solid that lack of long-range order characteristic of a crystal. In other words, the crystal structure is not a repeatable pattern. However amorphous material have some short-range order at the atomic length scale due to the nature of chemical bonding. Other type of amorphous solid exist in gels, thin films