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PROPERTIES OF N-TYPE AMORPHOUS CARBON THIN FILM AT DIFFERENT DEPOSITION TEMPERATURE FOR CARBON BASED SOLAR CELL APPLICATION

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ABSTRACT

The purpose of this study is to determine the suitability of amorphous carbon for the carbon based solar cell application. The amorphous carbon has the advantages which is tuneable band gap from 0.0eV to 5.5eV. The amorphous carbon (a-C) has been deposited onto the quartz substrate using chemical vapour deposition (CVD) technique at different temperature from 600˚C-750˚C with 50˚C interval. The a-C has been doped with nitrogen gas (N_2) as the N-type dopant and used camphor ($C_{10}H_{16}O$) in liquid form as natural precursor. The quartz were chosen because it is similar like glass which is see through but it can overcome high temperature rather than the glass. The effect of different deposition temperature have given different electrical properties of nitrogen doped amorphous carbon (a-C: N) by using the solar simulator system which is the conductivity of the thin film. As for the optical properties it has been investigated by a Perkin Elmer LAMBDA 750 UV-vis-NIR spectroscope. In the optical properties, there are transmittance spectra and absorption coefficient which are one of the parameter that will be measured to determine the best sample. The surface morphology of a-C: N also has been observed by using the Atomic Force Microscopy (AFM) which is the roughness of the film and Field Emission Scanning Electron Microscope (FESEM). It seems the higher the temperature, the sp^2 carbon bonding increases. The increase of sp^2 content will result in smaller band gap or zero band gap. The result shows the largest band gap were sample at temperature of 600°C. While for the higher temperature the band gap became smaller and reached zero band gap.

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CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

In this chapter, it consists several section which are project background, problem statement, objectives project, and scope of study and etc. This part will describe a short introduction about amorphous carbon thin film for carbon based solar cell by using chemical vapour deposition (CVD).

1.2 PROJECT BACKGROUND

Sun is the largest one in our solar system. Everyday sun transmit large amount of energy in the form of heat and radiations called solar energy. The solar energy that have been transmit by the sun were infinite source of energy and it is also renewable energy [1-2]. The benefits of using solar energy is that the energy can be continuously absorbed into solar energy with the use of tiny photovoltaic (PV) solar cells rather than conventional power generator [3].

The energy produced by the sun which is the solar energy are free from any contamination, gases, or any reaction by-product, thus it does not create any pollution. This is the reason it is the major source that lead to clean energy technology, in perspective of the unsettling influence by the emission of carbon from the non-renewable energy sources. One of the greatest favourable circumstances of solar energy is that it is free and reachable to all people and accessible in plentiful supply contrasted with that of the cost of different petroleum products and oils in the previous decade. Also, solar energy requires extensively bring down labour costs over conventional energy production technology. In spite of the fact that the solar are available everywhere, there is still an expenditure in developing the equipment in order to collect