CHARACTERIZATION OF NITROGEN DOPED AMORPHOUS CARBON THIN FILM USING NATURAL PRECURSOR

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ABSTRACT

This reports present on the deposition of semiconducting amorphous carbon (a-C) films fabricated onto the glass substrate and n-type silicon by Thermal Chemical Vapour Deposition (CVD) using natural source of camphoric carbon as the precursor material. Those samples were deposited at different flow rates of Argon and Nitrogen gases which both are varies with flow rates of 10, 15, 20, 25, 30, 35sccm. The thickness of thin film was measured by using Surface Profiler. From the characterization of the electrical properties using current-voltage (I-V) measurement, I-V graph was modelled for both conditions. The optical properties of thin film were measured by UV-VIS-NIR Spectrophotometer under the visible range. The structural properties of these films have been characterized by using Raman Spectroscopy and Atomic Force Microscope (AFM). There are significant changes in conductivity (dark and illumination), optical bandgap and structural properties when the flow rate was varied.. For undoped amorphous carbon, the 15sccm samples give the optimum value of conductivity, absorption coefficient, and Raman intensity ratio and have narrow band gap. While, for the Nitrogen doped amorphous carbon, the 30sccm sample give the highest value of conductivity, optimum absorption coefficient, optimum Raman intensity ratio and lowest bandgap.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Solar cells fabricated to date are very expensive compared to cost of electricity obtained by conventional process. The cost reduction of solar cells and establishment of environmentally friendly production processes are very important for the widespread of photovoltaic technology. Related to the search for an alternative material, carbon is highly attractive because of its potential application in photovoltaic solar cells and abundance in nature [1]. A lot of research has been focused on this area through innovative nanotechnology for improving the performance of solar cell materials. In conjunction with that, their applications have complied with environmental, industrial and domestic need [2-4].

The principle of solar cell is based on the semiconductor photovoltaic effect. Solar radiation is converted directly to electrical energy. When p-type silicon and n-type silicon is connected, the interface will be formed p-n junction which is between p-type and n-type the silicon in the crystal. The basic structure is a large-area plane p-n junction. When electron and hole diffusion occurs near the junction area, it will form the built-in electric field pointing form n-p area in the junction area. If the light on the solar cell is absorbed in the interface, enough energy photon inspires electron from the