NITROGEN DOPING OF AMORPHOUS CARBON THIN FILM PREPARED BY CAMPHOR USING THERMAL CVD

By

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ABSTRACT

This research investigates on the nitrogen doping of amorphous carbon thin film that have been prepared by camphor using thermal CVD method at different temperature. This research used argon (Ar), camphor oil and nitrogen (N) as carrier source and dopant gases, respectively. The effect of nitrogen doping of the amorphous carbon thin film on electrical and optical properties were characterized by using Current-Voltage (I-V) measurement and UV-VIS-NIR spectroscopy. The I-V measurement studies demonstrate that the current measured for sample that have been deposited at higher temperature gives more conductivity. Optical band gap for the undoped thin film is about 0.1 to 0.4 eV. This study also shows that the optical band gap (E_g) for doped thin film decreased from 0.5 to 0.1 eV when the deposition temperature is increased.

***Keywords*:** Nitrogen Doping, Amorphous Carbon, Thin Film, Camphor, Thermal CVD.

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CHAPTER 1

INTRODUCTION

1.7 Introduction

Carbon is the sixth element in the periodic table, it has six electrons and is listed at the top of column IV (group) consisting of silicon, germanium, tin and lead. The fourth group element has the general electronic configuration ns^2np^2 where electrons of carbon give rise to the electronic configuration $1s^2 2s^2 2p^2$. the property of the element in the IV group varies in which carbon shows non-metallic behaviour.

1.8 Different Forms of Carbon

Carbon can exists in many forms as diamond, graphite, carbines, activated carbons, fullerenes and carbon nanotubes and other acrylic forms. The mode of classifications are diamond that contains sp^3, graphite contains sp^2 and sp^1 for carbine. Besides the usual hybridization (sp^3, sp^2, sp^1), structures involving more than single type of hybridization (mixed forms) and intermediate hybridization of type sp^n (with $3 > n > 1$, $n \neq 2$) are included.

Diamond is sp^3 hybridization with cubic arrangement of crystal lattice, with 8 atoms per unit cell as shown in Fig. 1.1. It is optically transparent and has greater thermal conductivity than that of copper at room temperature, which is explicable by the small mass of the C atoms, the symmetry of the crystal lattice and the strong interatomic covalent bonds [1].