UNIVERSITI TEKNOLOGI MARA

IODINE DOPING OF AMORPHOUS CARBON THIN FILMS DEPOSITED USING CAMPHORIC CARBON PRECURSOR

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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ABSTRACT

Amorphous carbon (a-C) is expected to be an excellent material for fabricating low cost and high efficiency carbon based solar cells because of its interesting properties and feasibility of band gap engineering over a wide range. The preparation of a-C thin films was carried out by using thermal chemical vapor deposition (CVD) technique. The initial phase of this work involved the deposition of a-C thin films using camphor oil as an environmentally carbon precursor. The second phase is focused on the doping process of a-C thin films with iodine (I) as p-type dopant. The studies were done to determine the optimum parameters to obtain a p-type a-C:I thin film. The deposition temperature, deposition time and gas flow rate effects on the properties of a-C thin films were analyzed in details. The a-C thin films deposited at 550°C, 30 min and 35 sccm were considered as the best parameters throughout this work . For doping process, the a-C:I thin films is found to be influenced by doping temperature, amount of iodine and doping time effects. Based on the results, the a-C:I thin film prepared at 400°C, 1.0g and 10 min can be considered as the optimized parameter to produce higher conductivity ($\sim 10^{-3}$ $S.cm^{-1}$) and lower optical band gap. The optimum preparation parameters for a-C and a-C:I thin films have been identified. Comparison between without and with iodine doping on a-C thin film properties have also been studied. Hetero-junction of both films fabricated with n-Si found photovoltaic behavior.

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