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**PAPER TITLE:** Silicon Based Thin Film solar Cells

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**ABSTRACT:**

This project on silicon based thin film solar cells focuses on improving the optical and electrical properties of the p-layer in a p-i-n type silicon solar cell. It is desirable to have a wide band gap material in the p-layer and the layer should also be highly conductive, hence different structures of silicon have been researched to achieve these properties. This paper focuses on using heavily doped nanocrystalline silicon carbide for the p-layer as it has a high band gap and can be highly conductive depending on deposition conditions.

Electrical and optical properties including band-gap, conductivity, resistivity, crystallization fraction and surface roughness were all obtained for the layers deposited. Majority of the experiments done on the project were carried out at the London Center for Nanotechnology (LCN). Electrical properties were obtained using a Keithley probing station, band-gap experiments were conducted using a light source, monochromator and pyrodetector. Raman spectroscopy was conducted to obtain the crystallization fraction and the AFM was used to determine surface roughness.

The properties obtained are compared with the deposition conditions used in a PECVD. The p-layer giving the best properties was subsequently used in a solar cell and the overall solar cell characteristics were compared with other solar cells using different materials in the p-layer. Some good results were obtained at the end of the project and scientific conclusions were made.