

FABRICATION OF A SEMICONDUCTOR INSULATOR SEMICONDUCTOR
PHOTOVOLTAIC CONVERTER

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BY

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of Master of Science of the University of Nairobi*

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

 4/10/90

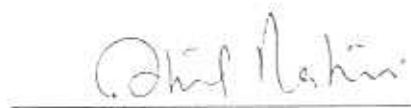
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ABSTRACT

Semiconductor Insulator Semiconductor (SIS) Photovoltaic Converters have been fabricated successfully by the spray pyrolysis and the Vacuum deposition techniques . The two techniques and fabrication processes have been discussed. Preparation of Fluorine doped Tin Oxide films is also presented. $\text{SnO}_2:\text{F}$ thin films with a sheet resistivity of $75 \Omega/\square$ were deposited on $100 \Omega\text{-cm}$ P type (111) boron doped silicon wafer by spray pyrolysis and necessary contacts applied yielding an open circuit voltage of 110mV, short circuit current density of $45 \mu\text{A}/\text{cm}^2$, fill factor of 0.25 and efficiency of 0.002% under $80\text{mW}/\text{cm}^2$ insolation.

Indium Tin Oxide thin films were deposited on similar silicon wafers using the vacuum coating unit and best values obtained for the cells were, open circuit voltage, 340mV, short circuit current density, $4.9\text{mA}/\text{cm}^2$, fill factor, 0.404 and cell efficiency 0.85%. Optical measurements of the films have been done and it has been found that the films are transparent and conducting.

The low efficiency can be attributed to high series resistance and possibly thick interfacial oxide layer.