

OPTICAL, ELECTRICAL AND STRUCTURAL PROPERTIES  
OF ZINC STANNATE ( $Zn_2SnO_4$ ) THIN FILMS PREPARED  
BY SPRAY PYROLYSIS TECHNIQUE.

BY

HIS THESIS HAS BEEN ACCEPTED FOR  
THE DEGREE OF M.Sc. 1997  
AND IS HEREBY RECORDED IN THE  
UNIVERSITY LIBRARY

JOSEPH MULIARO WAFULA, B.SC. (HONS.)

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE IN  
PHYSICS AT THE UNIVERSITY OF NAIROBI.

APRIL 1997

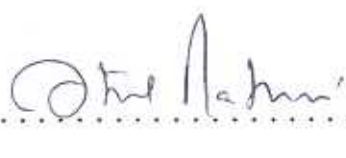
This thesis is my original work and has not been presented for a degree in any other university.

Joseph muliaro Wafula  
Department of Physics  
University of Nairobi

Signature.....  .....Date..... 8.4.97

This thesis has been submitted for examination with our approval as university supervisors.

Dr. A.K. Raturi  
Department of Physics  
University of Nairobi

Signature.....  .....Date..... 9th April 97

Dr. B.O. Aduda  
Department of Physics  
University of Nairobi

Signature.....  .....Date..... 9th April 1997





### ABSTRACT

Highly transparent and conducting  $Zn_2SnO_4$  films have been prepared by spray pyrolysis technique. Films grown at a substrate temperature of  $440^\circ\text{C}$  exhibit the best optical and electrical properties. The microcrystals of these films had a preferred orientation along c-axis normal to the surface. The direct band gap was found to be 3.1 eV. Hall effect studies on these films yielded a carrier concentration of  $1.2 \times 10^{20} \text{ cm}^{-3}$  and a mobility of  $2.5 \text{ cm}^2/\text{V}\cdot\text{sec}$ . These films have a potential to perform as good transparent conductors and can be used in solar energy devices such as solar cells and solar collectors.