

Wafula H. B., Simiyu J., Waita S M., Aduda B.O. and Mwabora J. M., Effect of nitration on pressed TiO₂ photoelectrodes for dye-sensitized solar cells, *African Journal of Science and Technology*, Vol. 8 No. 2, (2007) pp 63-71.

TiO₂ films made by the pressing method and then nitrogen-doped by heat-treatment in nitrogen, oxygen and argon gas mixture have been studied and the effects of structural characteristics, optical and electrical properties on the efficiency of a cell reported. Nitrogen gas ratio (Φ) in the doping procedure was varied from 0 to 0.024. Higher (Φ) resulted in decrease in film porosity, and XRD analysis of the TiO₂ films showed that nitrogen doping induced a rutile-to-anatase phase transitions. SEM shows that the particle sizes of nitrogen doped films reduced with increase of (Φ) from an average of 36 nm to 18nm. Optical measurements revealed that film transmittance improved and reflectance reduced in the visible light spectrum with nitrogen doping. Nitrogen doped TiO₂ photoelectrodes have been found to be more sensitive to visible light spectrum and has a narrower band gap. Photoelectrochemical measurements showed a large anodic shift of the onset potential for the cathodic scans of the order of 0.24V. The overall energy conversion efficiency, short circuit current and open circuit voltages of the solar cell fabricated with nitrogen doped TiO₂ photoelectrode were found to depend on (Φ). The cell fabricated with nitrogen doped TiO₂ photoelectrode had an overall efficiency of 0.70 % while the undoped had efficiency of 0.96 %.