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Paper

Microstructure characterization of onion (*A.cepa*) peels and thin films for dye sensitized solar cells

T Abodunrin[1], A Boyo[2], M Usikalu[1], L Obafemi[1], O Oladapo[1], L Kotsedi[3], Z Yenus[3] and M Maaza[3]

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Abstract

A.cepa peels are obtained from mature onion bulbs. Because of the continuous need for energy, alternative avenues for producing energy are gaining importance. The motivation for this work is based on an urgent need to source energy from readily available waste materials like domestic onion peels. Dye sensitized solar cells (DSSCs) fabricated via doctor blade method and high temperature sintering from waste (onion peels) are investigated for their ability to convert solar to electrical energy. The charge carriers were revealed under phytochemical screening. Functional groups of compounds present in *A.cepa* peel were analyzed with Fourier transform in infrared (FTIR). The influence of different electrolyte sensitizer is observed on the DSSCs under standard air mass conditions of 1.5 AM. The microstructure properties of these *A.cepa* DSSCs were explored using scanning electron microscope with energy dispersive spectroscopy (SEM/EDS), x-ray diffraction and Fluorecence spectroscopy (XRF). The interfacial boundary between *A.cepa* dye, TiO_2 framework of TiO_2 and indium doped tin oxide (ITO) reveals several prominent anatase and rutile peaks. Photoelectric results, revealed dye-sensitized solar cells with a maximum power output of 126 W and incident photon to conversion energy (IPCE) of 0.13%.This work has established that *A.cepa* peels can be used as a source of micro-energy generation.