ELECTRICAL AND OPTICAL CHARACTERISATION OF FLUORINE DOPED TIN OXIDE THIN FILMS DEPOSITED USING THE CHEMICAL VAPOUR DEPOSITION METHOD

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Abstract

This study examined the electrical and optical characteristics of a transparent and conductive fluorine doped tin oxide (FTO) thin films using the chemical vapour deposition method. The transparent and conductive FTO thin films were deposited on a glass substrate with Tin (iv) Oxide (SnO2), and Hydrofluoric acid (HF) as the major component of Tin (Sn), and Fluorine (F) respectively. The substrates were deposited at different temperatures (330oC, 350oC, 370oC, 390oC and 400oC). The influence of dopant concentration on the optoelectronic properties of FTO thin films were investigated by calculating the electrical and optical properties of the films. The optical properties were determined using the transmittance and reflectance values obtained from the UV spectroscope model AVA software 7.1. It was observed that the optical properties which is the transmittance T, reflectance R, absorbance A, and absorption coefficient α, of FTO films, increase and decrease as the wavelength increases at the same time. While the refractive index and energy band gap increases with an increase in temperature, and it was observed that the maximum energy band gap of the FTO thin film was obtained as 2.62eV at 400oC and the minimum energy 2.25eV at 330oC, which shows a significant effect of space substrate temperature on the FTO thin film. The electrical and structural properties were obtained using the resistivity and thickness values obtained from the four point probe machine. It was observed that the electrical properties which is the resistivity and the sheet resistance decreases with an increase in temperature, this in turn increase the conductivity of the FTO thin films, which shows the semiconducting nature of the FTO thin films. Also, the thickness of the films were determined and were found to be 0.5μm using the profiler machine.

Recent Publications

Ekpekpo A. (2011) – Proximity effect of the superconducting states between two superconductors of different parity - **Advances in Applied Science Research 2(2); 461 – 465**

Ekpekpo A. (2011) – Filtration of images in acoustic and optics **- Archives of Applied Science Research. 3(3); 20 - 28**

Ekpekpo A. (2012) – Symmetry Properties of Superconductors - **Australian Journal of Basic and Applied Sciences. 6(3); 81 – 86**

Ekpekpo A. And Akpojivi Lucky (2013) – Synthesis and Characterization of Cds and Cdse Quantum Dots by UV – VIS Spectroscopy**- Journal of Emerging Trends in Engineering and Applied Science (JETAS) 4(2); 273 – 280**

Ekpekpo A. and Chukwuka Doris. (2014) – Synthesis and Characterization of Silver Sulphide Quantum Dots by UV – AVA Spectroscopy**. International journal of applied Physics and Mathematics. 4(4); 263 – 266**



Biography

Arthur Ekpekpo is the current Dean of School of Science, Delta State University Abraka, Delta State Nigeria. He is a Professor of Solid State Physics, He is a Member, of: Nigerian Institute of Physics, Nigeria Association of Mathematical Physics and Science Association of Nigeria (SAN). He has over thirty eight (38) Publications with international reputable journals. He has supervised over twenty (20) Postgraduate students. He Obtained his Doctor of Philosophy (PhD) in Solid State Physics from Ambrose Alli University, Ekpoma, Nigeria. He is member of, University Admission Board; Member of Tetfund Journal Committee; Member of University Business Committee Faculty of Science Representative to the University Postgraduate Board. He is also the Chairman, of Student Disciplinary Committee.

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Notes/Comments: