



Contribution ID: 190

Type: not specified

INFLUENCE OF Cu^{2+} / Ti^{4+} CO-DOPING ON THE MORPHOLOGY, MICROSTRUCTURE AND OPTICAL PROPERTIES OF ZnO , SYNTHESIZED BY CARAMBOLA FRUIT JUICE METHOD.

Thursday, 21 November 2024 10:15 (15 minutes)

ZnO and $\text{Zn}_{1-(y+x)}\text{O}/\text{Cu}_y\text{Ti}_x$, (Ti , Cu , Cu/Ti -doped ZnO) were synthesized by modified oxalate route using carambola fruit juice as a precipitating agent. The wurtzite hexagonal structure formed saw the space group change from $P63mc$ to $p3$ with crystallite sizes varying from 15.1 to 17.5 nm. Infrared spectra (IR) of the single molecular precursor, indicated the formation of metallic oxalates. The influence of Cu^{2+} , Ti^{4+} and $\text{Cu}^{2+}/\text{Ti}^{4+}$ -doping on the microstructure, morphology and optical properties of the synthesized ZnO was studied. Scanning electron microscope (SEM) confirmed modification of morphology from cuboidal to porous spherical nano structures. The PXRD results revealed an insignificant contraction in cell volume as the dopant elements replaced Zn ions in the microstructure ($\text{Ti}_{0.02}\text{Cu}_{0.02}\text{Zn}_{0.96}\text{O}$, 0.5271nm^3 and ZnO , 0.5288nm^3) but improved mechanical properties such as dislocation density, microstrain and specific surface area, and optical properties such as absorbance and optical band gap. $\text{Ti}_{0.02}\text{Cu}_{0.02}\text{Zn}_{0.98}\text{O}$ showed a 17.17 % drop in microstrain, 9.63 % drop in dislocation density and 5.61 % increase in specific surface area and decrease in optical band gap within the rang 3.116eV to 2.998eV. Also, EDS results confirmed the incorporation of various dopant ions in the corresponding microstructures of ZnO . The results also revealed a modification in the crystallite size distributions. The new materials ($\text{Cu}_{0.42}\text{Zn}_{0.58}\text{O}$ and $\text{Ti}_{0.02}\text{Cu}_{0.02}\text{Zn}_{0.96}\text{O}$) have exhibited a greater propensity to better, microstructural and optical properties which could improve the electrical properties such as conductivity. Therefore, the newly synthesized samples have been confirmed to have improved mechanical, electrical and optical properties relative to the synthesized Zinc Oxide.

Scheme: Synthesis procedure of the co-doped ZnO by carambola fruit juice coprecipitation route

Primary authors: Dr ETAPE, Ekane Peter (University of Buea,); Prof. FOBA-TENDO, Josepha (Department of Chemistry, University of Buea)

Presenter: Dr ETAPE, Ekane Peter (University of Buea,)

Session Classification: AfLS Contribution

Track Classification: AfLS