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Abstract

Electrospun ZnO was deposited on a glass substrate from zinc acetate dihydrate ($Zn(CH_3COO)_2.2H_2O$) with polyvinyl acetate (PVAc) polymer dissolved in N, N, dimethyl formamide (DMF) and annealed in the presence of oxygen until organic molecules were decomposed. The resultant fibre was characterized Scanning Electron Microscope attached with Energy dispersive spectrophotometry (SEMEDS), Fourier transform infra-red (FTIR), Rutherford backscattering spectroscopy (RBS). SEMEDS and FTIR showed total decomposition of the organic precursor. The mean fibre width was found to be 260 nm while fibre thickness was 460 nm. XRD patterns show ZnO was corundum with the hexagonal wurtzite structure. The crystallite size obtained from the Debye formula was 54 nm. The optical analysis showed that the percentage transmittance increased after calcination. The material band gap for this electrospun ZnO fibre was found to be 3.28 eV. The material optical parameter such as dispersion energy, average oscillator strength, single oscillator strength were also calculated. The optical conductivity and dielectric plot showed that the material conductivity and dielectric properties increase with increasing photon energy and increases sharply around the material energy bandgap. The Urbach tail analysis of the materials shows that the materials obey the Urbach rule. Therefore, n-type electrospun ZnO fibre high refractive index could be attributed to excess oxygen.