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Improvement of luminescence properties by post annealing ZnO nanopowders prepared by chemical bath method

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Abstract content
   (Max 300 words)
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ZnO nanopowders were prepared by chemical bath method and dried at room temperature, further more they were annealed in air at 300 oC and 600 oC for 2 hours to study the effect of temperature. XRD, SEM, UV-vis, and PL characterization techniques were employed to analyse the structure, morphology, optical and luminescence properties of ZnO nanopowder samples. The obtained crystal structure from XRD was hexagonal wurtzite with the mean lattice parameters a = b = 3.25 Å and c = 5.18 Å. The increase in annealing temperature resulted into the grain size increase where the estimated grain size increased from ˜ 27 nm to ˜ 35 nm. SEM morphology shows small clustered nanoflakes at room temperature, at high annealing temperature the nanoflakes becomes more pronounced as a result SEM results confirmed the nanometer grain size. UV – vis reflectance spectra shows a maximum 90 % reflection edge at ˜250 nm, these reflection edge is red shifted to ˜350 nm as the annealing temperature increases. The band gap energy of ZnO nanopowders determined using Kubelka Munk's equation was found to decrease from 3.2 eV to 2.8 eV with an increase in the annealing temperature. PL measurements reveal the broad deep level emission in the blue region; due to increase in the annealing temperature the luminescence intensity was more intensified.

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