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SYNTHESIS OF ZINC OXIDE NANO TWINS USING ELECTROCHEMICAL DEPOSITION TECHNIQUE AT DIFFERENT CURRENT DENSITIES

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ABSTRACT- Zinc oxide (ZnO) nano twins were prepared directly by electrochemical deposition (ECD) on commercial conductive indium tin oxide (ITO) glass using two-electrode configurations. The deposition of ZnO nano twins has been performed with different current densities at 70°C for 15 minutes. The ZnO nano twins were investigated by XRD, EDX, FESEM, (UV-vis) spectroscopy, and PL spectroscopy. All as-prepared ZnO nano twins consisted with lengths of 100-700 nano meters. EDX showed the ratio of carbon dots migration from graphite electrode (cathode) to the ZnO structure increased with the increase in the current density. FESEM images reveal that the current density is the controlling factor for surface morphology. With rising of the current density, the nano twin-cones shape formed. The optical spectra showed direct band gap of 3.34, 3.31, 3.20, 3.11 eV for the samples synthesized at 5, 10, 15, and 20 mA respectively. PL showed the emergence of a broad peak along wavelength range of 480-650 nm with a weak peak at 370 nm in the PL spectra.

Keywords: ZnO, Nano twins, Twin-cones, Electrochemical deposition, Current density.