**The effect of green body pressure, sintering time and electric current on ZnO crystal growth by electric current heating method**

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**Abstract:**

There are three objectives to be achieved in this research which include to synthesis high purity ZnO pellets with different sintering time and green body pressure by using powder metallurgy process, the growth of ZnO crystal on ceramic bar by applying different current when conducting electric current heating (ECH) method and the characterization of ZnO crystal growth. In this research, high purity of ZnO powder is grinded and compressed at 3.5 tons, 4.5 tons and 5.5 tons to fabricate ZnO green pellets. Then, the ZnO green pellets are sintered for 3 hours and 5 hours. Next, the pellets are cut into bars and apply ECH method. The amount of current applied for the crystal growth are 2A and 3A. Finally, the crystal grown on the ZnO ceramic bar is characterized using X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Ultraviolet-visible Spectroscopy (UV-Vis) and Photoluminescence Spectroscopy (PL). High purity ceramic pellets are successfully synthesis by powder metallurgy process. By conducting ECH method, crystal are grown on the surface of ceramic bar. Most crystal structure found in ZnO ceramic bar is needle-liked rod structure which is hexagonally formed by many nanorod. The crystal grown in (100) orientation with the crystalline size of from 57.80 nm to 100.31 nm. The band gap energy obtained from UV-Vis were found between 3.2 eV to 3.4 eV which is nearly similar to the theoretical value of 3.37 eV. Lastly, PL emission measurement give the peak that range between 579 nm to 587 nm which indicate that the sample exhibit yellow colour. Among three different pressure applied, 4.5 tons gives the lowest emission energy. It is considered as the critical pressure in the synthesis of ZnO crystal. The intensity of PL is considered inversely proportional to intensity of XRD in [100] direction. Pressing pressure doesn’t show significant effect on the crystal growth of ZnO but current applied during ECH method and sintering time do give effect on UV-Vis absorption spectra and XRD result respectively.

**Keywords:** Characterization of Crystal Growth; Crystal Growth; ECH Method; Powder Metallurgy Process; ZnO

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