

A facile thermal-treatment route to synthesize ZnO nanosheets and effect of calcination temperature

ABSTRACT

A facile thermal-treatment route was successfully used to synthesize ZnO nanosheets. Morphological, structural, and optical properties of obtained nanoparticles at different calcination temperatures were studied using various techniques. The FTIR, XRD, EDX, SEM and TEM images confirmed the formation of ZnO nanosheets through calcination in the temperature between 500 to 650°C. The SEM images showed a morphological structure of ZnO nanosheets, which inclined to crumble at higher calcination temperatures. The XRD and FTIR spectra revealed that the samples were amorphous at 30°C but transformed into a crystalline structure during calcination process. The average particle size and degree of crystallinity increased with increasing calcination temperature. The estimated average particle sizes from TEM images were about 23 and 38 nm for the lowest and highest calcination temperature i.e. 500 and 650°C, respectively. The optical properties were determined by UV–Vis reflection spectrophotometer and showed a decrease in the band gap with increasing calcination temperature.

Keyword: Facile thermal-treatment route; ZnO nanosheets; Calcination temperatures