

Large-scale synthesis of ZnO micro-balls composed of thin nanosheets via sol-gel method

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The semiconductor ZnO is an important inorganic material which has various applications in ceramics, catalyst, rubber, cosmetics, varistors with a direct wide band gap (3.37eV) and high exciton binding energy (60 MeV) at room-temperature, presenting itself as a promising material for the wide range of well-know technological as well as an important functional material for the future research and applications. In this connection we synthesized zinc oxide micro-balls at around $\sim 70^{\circ}\text{C}$ temperature by the sol-gel method using zinc nitrate hexahydrate and sodium hydroxide. Morphological observations were carried out by Field Emission Scanning Electron Microscopy (FESEM). The transmission electron microscopy also consisted with the FESEM data and it reveals that the micro balls are arranged with several hundreds sheets of zinc oxide. As grown sample composition was analyzed by the FTIR spectra. It shows a characteristic peak of zinc oxide at 523 cm^{-1} . The X-ray diffraction patterns indexed as the hexagonal zinc oxide with lattice constants $a=3.249$ and $c=5.206\text{\AA}$, well matched with the available Joint Committee on Powder Diffraction Standards (JCPDS 36-1451).