

Synthesis and characterization of zinc ferrite (ZnFe_2O_4) nanoparticles by using ball mill technique

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Abstract: A fine powder of zinc ferrite (ZnFe_2O_4) was prepared by using high energy ball mill. Number of balls used for respective samples were 0, 3, 6 and 10, and grinding of each sample was done for four hours. Nucleation of Zn-ferrite particles takes place by solid-state diffusion between ZnO and Fe_2O_3 precursors. The process of mechano-synthesis of ZnFe_2O_4 at room temperature led to the formation of ZnFe_2O_4 . XRD gives information about the phase formation of zinc ferrite, and to estimate the average crystallite size by using Scherer formula. SEM equipped with EDS provides information about microstructure and composition of the powder samples. AFM is used to determine particle size and roughness of ZnFe_2O_4 pellets. UV-Visible Spectroscopy is used to obtain the band gap of Zinc ferrite nanoparticles. This study provides new insight into the design and preparation of finer nanoparticles with spherical structure in high yield. These materials find it application in various fields such as drug delivery system, heat transfer in automobile industries and in various electronic devices

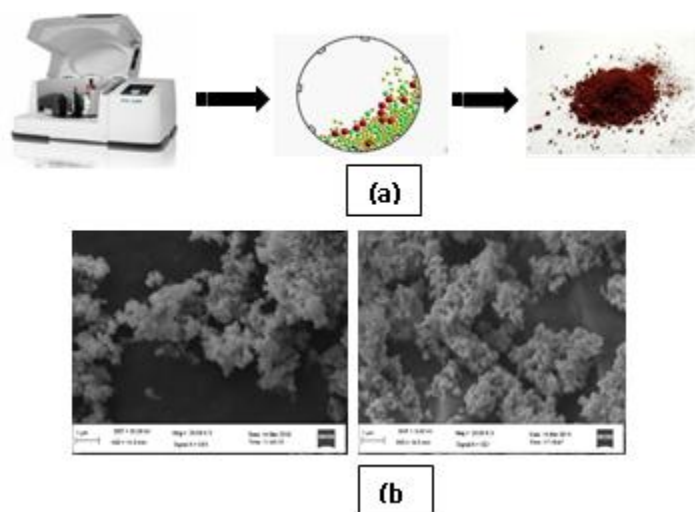


Figure 1: (a) Schematic representation of planetary ball mill (PM-100) used to crush the precursors (ZnO and Fe_2O_3) to form fine nanopowder of zinc ferrite. (b) SEM images of zinc ferrite nanoparticles ground with 3 and 10 balls respectively.

References:

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