

Structural and Thermal Characterization of 1% Fe-doped ZnO Powder Nanostructures Prepared by Mechanical Alloying as Transparent Ceramic for Optical Applications

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Abstract : ZnO powder nanoparticles mechanically alloyed were doped with iron to investigate their structural and microstructural properties using X-ray diffraction (XRD) for examined 1% Fe doped ZnO. The ZnO starting pure powder exhibited a hexagonal crystal structure with space group $P6_3mc$ of ZnO, however with the introduction of 1% Fe in the ZnO milled powder, the hexagonal ZnO phase remained unchanged, whereas the microstructural parameters were subject to significant variations due to the introduction of Fe atoms into the ZnO hexagonal matrix to replace oxygen ones. The size of crystallites and microstrains are found milling time dependent. For the applications of Zinc oxide, Zinc oxide (ZnO) is a potential candidate material for optics applications which has attracted considerable attention over past decades due to its wide potential applications such as ZnO photonic crystal slab, photo catalyst, antibacterial treatment, UV absorption, light emitting diodes, photo detectors, solar cells, gas sensors and so on.

Keywords : ZnO, XRD, microstructure, Optics applications