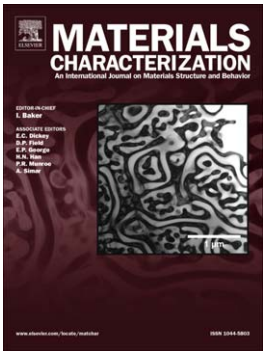

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Investigation and characterization of ZnO single crystal microtubes

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Abstract

Morphological, structural, and optical characterization of microwave synthesized ZnO single crystal microtubes were investigated in this work. The structure and morphology of the ZnO microtubes are characterized **using** X-ray diffraction (XRD), single crystal diffraction (SCD), field emission scanning electron microscopy (FESEM), energy dispersive X-ray spectroscopy (EDX), and transmission electron microscopy (TEM). The results reveal that the as-synthesized ZnO microtube has a highly regular hexagonal cross section and smooth surfaces with an average length of 650-700 µm, an average outer diameter of 50 µm and wall thickness of 1-3 µm, possessing a single crystal wurtzite hexagonal structure. Optical properties of ZnO **single crystal** microtubes were investigated by photoluminescence (PL) and **ultraviolet-visible** (UV-vis) absorption techniques. Room-temperature **PL** spectrum of the microtube reveal a strong UV emission peak at around 375.89 nm and broad and a weak visible emission with a main peak identified at 577 nm, which was assigned to the nearest band-edge emission and the deep-level emission, respectively. The band gap energy of ZnO microtube was found to be 3.27 eV.

Keywords: ZnO; Microtubes; Microwave; Structural properties; Optical properties.