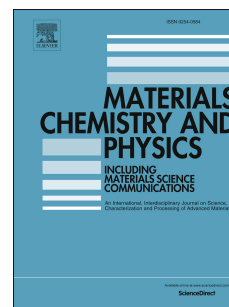


# Accepted Manuscript

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# Structural, Morphological and Optical Properties of $\text{Ba}_{1-x}\text{Cu}_x\text{TiO}_3$ ( $x = 0.2, 0.4, 0.6, 0.8$ ) Nanoparticles Synthesized by Hydrothermal Method

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## Abstract

A series of  $\text{Ba}_{1-x}\text{Cu}_x\text{TiO}_3$  ( $x = 0.2, 0.4, 0.6, 0.8$ ) nanoparticles were synthesized via the hydrothermal technique. The diffraction study confirms the cubic phase formation of barium copper titanate ceramics. The high concentration of copper addition ( $x = 0.8$ ) manifests that the crystal structure undergoes transformation from cubic to mixed phases (cubic and copper titanate). The X-ray density ( $D_x$ ) and bulk densities ( $D_b$ ) are decreasing with copper content. The surface morphology was investigated using field emission scanning and transmission electron microscopes (FESEM & TEM). The results provide the non-uniform grain structure. The average grain size is found to be varying between 57 to 181 nm. The TEM study shows the platelet like nanoparticles for  $x = 0.8$  and similar observations were made from FESEM. The presence of metal oxide bonds (M-O) were evaluated from Fourier transform infrared spectra. The UV-Visible spectra attribute the optical band gap energy ranging from 1.56 to 1.46 eV.

**Keywords:** Structure; Ceramic Titanate; Nanoparticles; Optical Band Gap; Field Emission Scanning Electron Microscopy.

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