

Synthesis, Characterization, and Photocatalytic Activity of Ba-Doped BiFeO₃ Thin Films.

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Abstract: Abstract: In the present paper, Bi_{1-x}Ba_xFeO₃ (BBFO) thin films (where $x = 0, 0.02$ and 0.05) were prepared by a combined sol-gel and spin-coating method. The influence of Ba substitutions on the structural, microstructural, optical properties, and photocatalytic activity of BiFeO₃ thin films has been studied. X-ray diffraction pattern correlated with FTIR analysis results confirms that all the films have a perovskite structure of rhombohedral symmetry with an R3m space group. Atomic force microscopy (AFM) and scanning electron microscopy (SEM) were used to investigate the surface morphology and reveals microstructural modifications with the increase in Ba concentration. The optical properties show that the band gap is narrowed after doping with Ba ions and decreases gradually with the increase of doping content. The photocatalytic investigations of deposited films revealed that Ba doping of BFO material leads to the enhancement of photocatalytic response. The present data demonstrates that Bi_{1-x}Ba_xFeO₃ (BBFO) thin films can be used in photocatalytic applications.

Keywords : perovskites; films; optical properties; doped BaTiO₃; photocatalytic activity