

63. Study Of Structural, Thermal And Non-Linear Optical Properties Of Some Gel Grown, Doped And Undoped Crystals Of Barium Iodate, Monohydrate

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ABSTRACT

Single crystals of barium iodate, monohydrate [Ba (IO₃)₂, H₂O], which exhibit prominent non-linear optical property were grown by gel method. Since this compound decompose before its' melting point, conventional high temperature methods for growth are not applicable. Moreover the method is simple and inexpensive. These crystals were also doped with impurities such as Fe³⁺ and Cu²⁺ to study their effect on properties of grown crystals. Silica gel was used as growth medium. Optimum growth conditions were established. Prismatic, dendritic crystals of barium iodate were obtained.

The X-ray diffractograms of grown crystals were recorded. They match very well with the standard JCPDS data. Diffractograms manifest that impurities have been accepted only in certain planes, but crystal structure remains unaffected. However small changes in lattice parameters in volume of unit cell are observed. This change may be attributed to ionic radii of doped impurities. (Ba²⁺ = 1.35Å⁰, Cu²⁺ = 0.73Å⁰, Fe³⁺ = 0.645Å⁰)

Thermal analysis of doped and undoped barium iodate shows two steps on heating the samples. First, they undergo dehydration and then decompose beyond 550⁰ C. It is observed that there are no structural changes due to doping.

Powder SHG measurement is a simple and quick experimental technique for the evaluation of second order nonlinear optical properties of material, was used to determine the magnitude of nonlinear coefficient of grown crystals. Results indicate that, barium iodate crystals are having nonlinear optical property. Cu-doping reduces nonlinear optic property significantly. Fe-doping also has negative effect but less than Cu-doping

Keywords. Barium iodate, Silica gel, Doping, XRD, TGA/DTA, NLO property, SHG.