

Author's Accepted Manuscript

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www.elsevier.com/locate/jcrysgr

PII: S0022-0248(15)00255-9
DOI: <http://dx.doi.org/10.1016/j.jcrysgr.2015.03.033>
Reference: CRY522783

To appear in: *Journal of Crystal Growth*

Received date: 26 September 2014

Revised date: 12 March 2015

Accepted date: 16 March 2015

Cite this article as: A. Silambarasan, M. Krishna Kumar, A. Thirunavukkarasu, R. Mohan Kumar, P.R. Umarani, Synthesis, crystal growth, solubility, structural, optical, dielectric and microhardness studies of Benzotriazole-4-hydroxybenzoic acid single crystals, *Journal of Crystal Growth*, <http://dx.doi.org/10.1016/j.jcrysgr.2015.03.033>

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Synthesis, crystal growth, solubility, structural, optical, dielectric and microhardness studies of Benzotriazole–4–hydroxybenzoic acid single crystals

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Abstract

Organic Benzotriazole–4–hydroxybenzoic acid (BHBA), a novel second-order nonlinear optical single crystal was grown by solution growth method. The solubility and nucleation studies were performed for BHBA crystal at different temperatures 30, 35, 40 45 and 50°C. Single crystal X-ray diffraction study reveals that the BHBA belongs to Pna2₁ space group of orthorhombic crystal system. The crystal perfection of BHBA was examined from powder and high resolution X–ray diffraction analysis. UV–Visible and photoluminescence spectra were recorded to study its transmittance and excitation, emission behaviors respectively. Kurtz powder second harmonic generation test reveals that, the frequency conversion efficiency of BHBA is 3.7 times higher than that of potassium dihydrogen phosphate (KDP) crystal. The dielectric constant and dielectric loss values were estimated for BHBA crystal at various temperatures and frequencies. The mechanical property of BHBA crystal was studied on (110), (010) and (012) planes by using Vicker’s microhardness test. The chemical etching study was performed on (012) facet of BHBA crystal to analyse its growth feature.

Keywords: A1. High resolution X-ray diffraction; A2. Growth from solutions;

B1. Organic compounds; B2. Nonlinear optic materials

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