

TEM CRAMS OF DISTINCTIVE NLO MATERIAL (SECOND HARMONIC GENERATIVE TYPE) BARIUM PARA NITROPHENOLATE(BPNP)

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ABSTRACT

Single crystals of Barium para nitrophenolate sample has been grown by solution growth method and Microscopic analysis - TEM is carried out for proper internal analysation and given here for reference. The specimen has a special specification of SHG efficiency of more than 16 times than KDP [1] the single XRD data also given here for comparison and analysation of the materials.

Key words

Single crystals, Barium para nitrophenolate, Microscopy, XRD...

1.INTRODUCTION

Crystal growth necessitates solubility, preparation of homogeneous solutions, properties of solvents, saturation and super saturation of the solution grown specimen with the solute and solvent stoichiometry.

The experimental strategy to grow the crystals beneath assorted circumstances along with the kinetics and procedure of crystal chemistry is significant. Single crystals of the family of para nitro phenolates have drawn the notice of investigators over the past few time. Prose has reported that single crystals of barium para nitrophenolates have NLO efficiency sixteen times greater than that of KDP one.

NLO

Nonlinear optics (NLO) is the division that depicts the performance, medium in which the P as dielectric polarisation responds nonlinearly to the electric field E of the light. This nonlinearity is emblematically only examined at extremely elevated luminosity intensities (values of the electric field analogous to interatomic electric fields, typically of the value in 10^8 V/m) such as those afforded by Laser source.

In nonlinear optics, the superposition principle no longer grasps. An appraisal is there that status of the non-linear optical materials and devices, and their applications for optical signal processing and computing. Recent advances in engineering semiconductor microstructures are conversed and shown to increase their non-linear optical susceptibilities in comparison with the immensity semiconductors.

Using the photorefractive matters as an instance, we define a set of figures of merit supported on the conditions from the optical devices for system functions. Using these figures of merit we estimate and confer the different photorefractive matters.

SHG

Second harmonic generation (SHG - also called frequency doubling) is a nonlinear optical progression, in which photons interacting with a nonlinear material are efficiently "shared" to form new photons with twice the energy, and therefore twice the frequency and half of the wavelength of the initial photons. It is a special case of frequency generation.

NLO applications involves the proper selection of the Crystal Parameters are Spectral Acceptance, Crystal Size, Walk-off Angle, Acceptance, Temperature Acceptance, Moisture, Phase-Matching Type and Angle Damage Threshold, Velocity Mismatching, Damage Threshold...

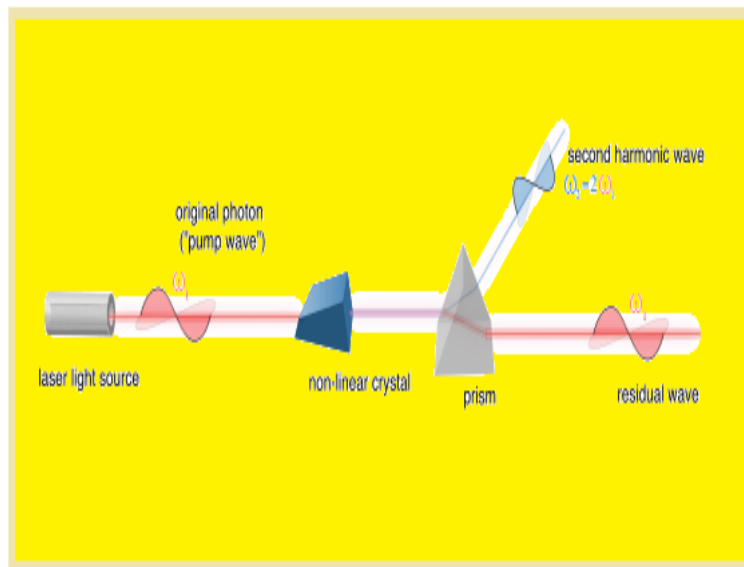


Fig.1.SHG Schematic output

2. EXPERIMENTAL

2.1 SINGLE CRYSTAL XRD DATA FOR BPNP

Single crystal of barium para nitrophenolate is grown from aqueous solution by the slow evaporation technique. The crystal grown by this method is colored and has a growth period of four weeks. The single crystal is of dimension 10X10X7 mm³. The crystal materializes to be of excellent quality and is non hygroscopic in character [2].

Empirical formula	C ₂₄ H ₂₆ Ba N ₄ O ₁₆
Formula weight	763
Crystal system, space group	Orthorhombic, Fdd2
Unit cell dimensions	a = 19.899 Å alpha = 90 deg. b = 28.019 Å beta = 90 deg. c = 10.745 Å gamma = 90 deg.
Volume	5991 Å ³

2.2. TEM APPROACH FOR BPNP

TEM – Transmission Electron Microscopy is a microscopy in which beam of electrons are transmitted through an ultra thin sample and interacting with the specimen it passes through it. TEM has superior resolution than other any other type of microscopes, owing to the small de Broglie wavelength of electrons. SEM is for surface morphology and TEM is for internal composition and its image projection is on a fluorescent screen.

The TEM approach of BPNP is given in the Fig.2. Since the spectral approach and SEM and AFM approaches of the crystal are already discussed in the previous journal paper [8], we hereby enclosed the TEM 100 nm approach of BPNP. Here, the crystal is approached for TEM and we observed that the crystal has no major flaws and free from defects and has clear inner infrastructural parameters of arrangements of atoms with micro apertures and few void space and spherical conglomerty with quality NLO back ground and found to be efficient than KDP anisotropic.

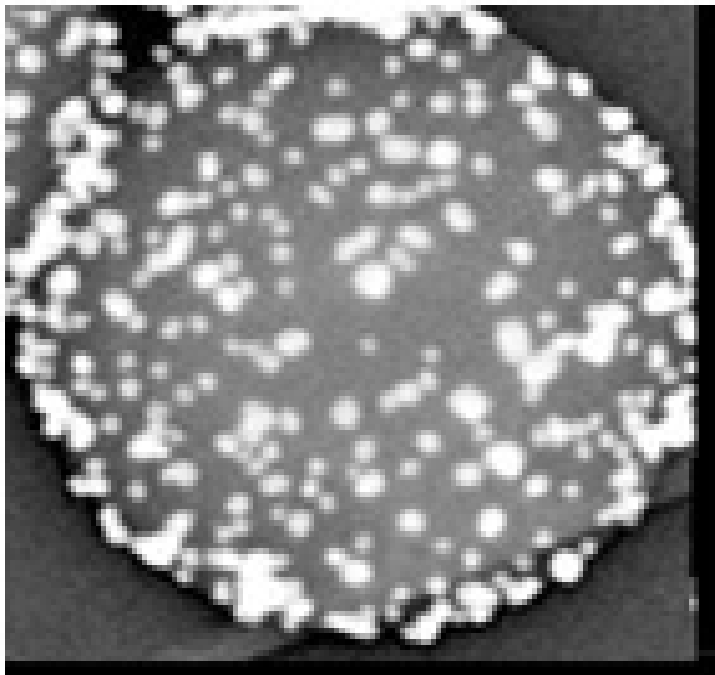


Fig.2. Tem Reprmentation Of Bpnp

CONCLUSION

Single crystals of barium para nitrophenolate ($C_4H_26BaN_4O_{16}$) is grown by slow evaporation solution growth method. The grown crystals are subjected to various characterization studies and the results are presented and discussed. Single crystal X-ray

diffraction study reveals the crystal forms to be in orthorhombic system as $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$.

TEM Microscopic analysis confirms the growth of barium para nitrophenolate single crystal with good quality and reveals that the crystal is free from flaws observed that the crystal has no major flaws and free from defects and has clear inner infrastructural parameters of arrangements of atoms with micro apertures and few void space and spherical conglomery with quality NLO back ground and found to be efficient than KDP anisotropic [5, 6, and 7].

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