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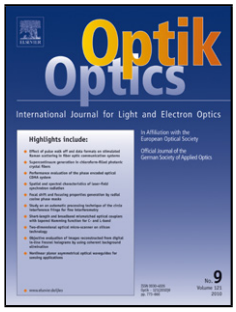

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PII: S0030-4026(17)31320-7
DOI: https://doi.org/10.1016/j.ijleo.2017.10.107
Reference: IJLEO 59843

To appear in:

Received date: 1-8-2017
Accepted date: 20-10-2017

Please cite this article as: R.N.Shaikh, Mohd Anis, M.D.Shirsat, S.S.Hussaini, Emphasized analysis on linear and laser induced nonlinear optical traits of citrulline doped NH4H2PO4 (ADP) crystal, Optik - International Journal for Light and Electron Optics https://doi.org/10.1016/j.ijleo.2017.10.107

Emphasized analysis on linear and laser induced nonlinear optical traits of citrulline doped $NH_4H_2PO_4$ (ADP) crystal

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Abstract

The current investigation is aimed to explore the optical studies of citrulline doped ammonium dihydrogen phosphate (ADP) crystal by employing crystal growth, structural, UV-visible, Kurtz-Perry test and Z-scan characterization techniques. The growth of citrulline doped ADP single crystal has been achieved by slow solvent evaporation technique at ambient temperature. The grown crystals have been subjected to single crystal X-ray diffraction technique for structural analysis. The functional groups of grown crystal have been qualitatively identified by means of Fourier transform Infrared analysis. The influence of citrulline on optical transmittance of ADP crystal has been evaluated within 200-900 nm by means of UV-visible spectral analysis. The enhanced second harmonic generation (SHG) efficiency of citrulline doped ADP crystal has been determined using the Q-switched mode Nd:YAG laser and it is found to be 2.18 times higher than standard KDP crystal. The third order nonlinear optical (TONLO) behavior of citrulline doped ADP crystal has been investigated using He-Ne laser operating at 632.8 nm. The close and open aperture Z-scan configuration has been used to evaluate the nature of TONLO refraction (n_2) and absorption (β). The magnitude of TONLO parameters of citrulline doped ADP crystal has been determined using the Z-scan transmittance data. The potential liability of citrulline doped ADP crystal for optical applications has been discussed.

Keywords: Crystal growth; Optical studies; Nonlinear optical materials; X-ray diffraction