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Synthesis, crystal growth, thermal and Laser damage threshold properties of new Schiff base NLO material 4-Nitro-benzoic acid (3-ethoxy-2-hydroxy-benzylidene)-hydrazide

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Abstract

Novel organic Schiff base nonlinear optical material 4-Nitro-benzoic acid (3-ethoxy-2-hydroxy-benzylidene)-hydrazide (NEH) was synthesized and grown as single crystal by slow evaporation technique. The structure and unit cell parameter of NEH was confirmed by single crystal X-ray diffraction analysis and the crystal belongs to orthorhombic crystal system with noncentrosymmetric space group $Pna2_1$. Further both carbon and hydrogen NMR spectra confirm the formation of material and the presence of functional group was analyzed by Fourier Transform Infrared (FTIR) analysis. The optical absorption spectrum of the grown crystal shows the material has lower cut off wavelength at 320 nm. Thermal property of NEH was studied by TG/DTA analysis. The second harmonic nonlinear efficiency was accessed by Kurtz-Perry powder technique and it possesses an efficiency of 0.7 times that of standard KDP. The laser damage threshold of NEH crystal was found to be 3.22 GW/cm^2 .

Keywords: Schiff base, organic material, crystal growth, molecular structure, second harmonic generation, thermal analysis.

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