

Synthesis, Growth, Spectral, Optical, Thermal and Non-Linear Optical Applications of a Semi-Organic Single Crystal: Potassium Dihydrogen Phosphate- Oxalic Acid

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Abstract: A semi organic nonlinear optical material a single crystal of Potassium dihydrogenorthophate - oxalic acid [PDPOA] has been magnificently manufactured and good quality single crystals have been grown by Slow Evaporation Technique at ambient temperature. The grown crystals were characterized by powder X-ray diffraction study shows that the crystalline perfection of grown crystal is good. Single crystal X-ray diffraction studies reveal the lattice parameters of the crystal. The optical absorption [UV-Vis] studies show that the crystal is transparent in the visible region with a lower cut of wavelength of 235 nm and the optical band gap energy E_g is determined to be 5.27 eV. The functional group present in the grown crystal has been acknowledged by Fourier Transform infrared spectroscopy [FTIR] and FT-Raman spectroscopy [FT-Raman] analyses. Fluorescence [PL] emission spectrum was noted and lifetime was also studied. The Vickers micro hardness test carried out on the grown crystal and by Vickers hardness number (H_v), work hardening coefficient (n), yield strength (σ_y), stiffness constant (C_{11}), Knoop hardness (H_k) are evaluated. The dielectric behavior of the as grown crystal was analyzed for various temperatures (313 K, 333 K, 353 K, 373 K) at different frequencies. The Kurtz Perry was confirmed using Nd:YAG laser with fundamental wavelength of 1064 nm.

Key words: Nonlinear optical material; X-ray diffraction; Optical properties; Dielectrics; Life time; Micro hardness.

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