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Studies on crystal growth, vibrational, optical, thermal and dielectric properties of new organic nonlinear optical crystal: Bis (2, 3-dimethoxy-10-oxostyrychnidinium) phthalate nonahydrate single crystal

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Abstract

In this paper, we report the synthesis, growth and characterization of a new organic NLO single crystal of Bis (2, 3-dimethoxy-10-oxostyrychnidinium) phthalate nonahydrate, for the first time. The single crystal XRD study reveals that the crystal belongs to monoclinic system. The molecular structure and the nature of the vibrations were identified by vibrational and NMR spectroscopic studies. The UV absorption edge was found to be 330 nm with a wide optical transmittance window covering the visible region. The crystal exhibits physicochemical stability upto 90.56°C. Various thermodynamic parameters were calculated from the TG data. The Kurtz powder second harmonic generation revealed that the SHG efficiency of the grown crystal was about 2.8 times that of KDP and was found to be phase matchable. The measured low value of birefringence indicates its suitability for NLO devices. The dielectric behavior of the grown crystal was analyzed for different frequencies at different temperatures.

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