

Assessment on third order non linearity and other optical analyses of L-Asparagine Monohydrate single crystal: An efficient candidate for harmonic conversions

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Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy. 151, 419–425, 2015

Abstract

Single crystal of l-Asparagine Monohydrate, an organic material has been successfully grown by slow evaporation solution growth technique at ambient condition. The lattice parameters and its strain of the grown crystal have been evaluated from powder X-ray diffraction and found that it belongs to orthorhombic crystal system. The polarizability has been measured by using the Clausius-Mossotti relation. The crystalline perfection of grown single crystal has been examined by high resolution X-ray diffraction and its imperfection in the diffraction plane was clearly visible by recording topographical image of the plane. From the high resolution XRD, it confirms that the crystal contained high crystalline perfection. The optical behavior was analyzed by photoluminescence and birefringence methods. In the photoluminescence, a broad peak has been observed at 475nm which suggest that it emits blue light. The decay tendency of the material has also been observed by calculating decay constant. The optical homogeneity has been determined by the dispersion pattern of the material. The two photon absorption coefficient was further calculated by Z-scan, which gives the information about the third order non linear optical behavior of the material. The value of two-photon absorption coefficient is 4.25×10^{-12} m/W. The thermal parameters like thermal effusivity, thermal diffusivity, specific heat and thermal conductivity was obtained by using photopyroelectric technique. The ferroelectric behavior of the grown specimen was analyzed from PE (polarization VS electric field) loop. The loop suggests that the material was a nearly equivalent to ideal capacitor.