



ChemTech

International Journal of ChemTech Research

CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.13 No.03, pp 274-282, 2020

Studies on Optical Constants and Solid State Parameters of a Semi-organic Nonlinear Optical Material L-Methioninium Nitrate for Optoelectronic Device Fabrication

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Abstract : Semi-organic nonlinear optical material L-methioninium nitrate have been synthesized by the slow evaporation technique at room temperature. The synthesized crystal structure lattice parameters are found to be $a = 10.68 (2) \text{ \AA}$, $b = 5.47 (2) \text{ \AA}$, $c = 16.725.47 (2) \text{ \AA}$; $\alpha = \gamma = 90^\circ$, $\beta = 100.7^\circ$ by single crystal X-ray diffractometer. The grown crystal belongs to a monoclinic structure and non-centrosymmetric space group $P2_1$. Optical properties were determined from optical absorption studies to compute the absorption range, band gap, refractive index and electrical susceptibility of L-methioninium nitrate. Dielectric parameters of the sample carried out at different temperature in the frequency range from 100 Hz to 5 MHz. The solid parameters such as plasma energy, Penn gap, Fermi energy and polarizability of L-methioninium nitrate have been determined using dielectric studies. The second harmonic generation efficiency of the grown crystal has been confirmed by Kurtz and Perry technique. These preliminary investigations suggest that the present compound L-methioninium nitrate can serve as a potential material for optoelectronic device fabrication.

Keywords : Nonlinear Optical Material, Optical studies, Solid state parameters, NLO test and L-Methioninium Nitrate.

P. Vasudevan et al /International Journal of ChemTech Research, 2020,13(3): 274-282.

DOI= <http://dx.doi.org/10.20902/IJCTR.2019.130325>
