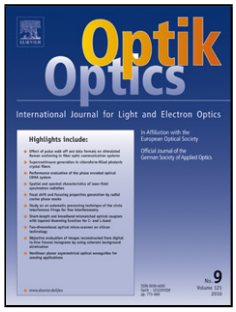

Title: Growth and characterization of semi-organic nonlinear optical (NLO) Guanidinium trichloroacetate (GTCA) single crystal

Authors: P. Karuppasamy, Muthu Senthil Pandian, P. Ramasamy, S.K. Das

PII: S0030-4026(17)31640-6
DOI: https://doi.org/10.1016/j.ijleo.2017.12.012
Reference: IJLEO 60134

To appear in:

Received date: 31-1-2017
Revised date: 5-11-2017
Accepted date: 5-12-2017

Please cite this article as: Karuppasamy P, Pandian MS, Ramasamy P, Das SK, Growth and characterization of semi-organic nonlinear optical (NLO) Guanidinium trichloroacetate (GTCA) single crystal, *Optik - International Journal for Light and Electron Optics* (2010), https://doi.org/10.1016/j.ijleo.2017.12.012

Growth and characterization of semi-organic nonlinear optical (NLO) Guanidinium trichloroacetate (GTCA) single crystal

P. Karuppasamy[1], Muthu Senthil Pandian[1]*, P. Ramasamy[1], S. K. Das[2]
[1]SSN Research Centre, SSN College of Engineering, Chennai-603 110, Tamilnadu, India

[2]Department of Physics, School of Applied Sciences, KIIT University, Bhubaneswar-751024, Odisha, India

Abstract

The semi-organic nonlinear optical single crystal of guanidinium trichloroacetate (GTCA) was grown by slow evaporation solution technique. The grown crystal was subjected to single crystal XRD studies to confirm the lattice parameters. Fourier transform infrared (FTIR) analysis was carried out to identify the functional groups of the grown crystal. The UV-Vis NIR spectrum was carried out and the calculated band gap energy was found to be 4.72 eV. The thermal behavior of the grown crystal was analyzed by thermal gravimetric-differential thermal analysis (TG-DTA). This shows that there are no weight losses upto 160 °C. The photoconductivity study reveals that the grown crystal has negative photoconductive nature. Vickers microhardness analysis was carried out to identify the mechanical stability of the grown crystal. Chemical etching study was carried out using water etchant and the etch pit density (EPD) was calculated. The electronic polarizability was calculated from the solid state dielectric related parameters such as valence electron, plasma energy, Penn gap and Fermi energy for the GTCA using the empirical relation. These estimated values were utilized to report the electronic polarizability. It well matches to the value calculated from Clausius-Mossotti relation and optical band gap energy. The Kurtz-Perry powder technique was used to analyze second harmonic generation (SHG) efficiency of the grown crystal.