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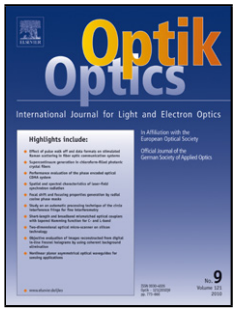

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Optical, photoconductivity and dielectric studies of zinc sulphate added glycine crystal for photonics applications

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Highlights:

- NLO material γ-glycine from $ZnSO_4$ has been synthesized and grown.
- γ-glycine highly transparent in visible and NIR region with lower cut-off of 210 nm.
- SHG efficiency of grown γ-glycine crystal is 3.18 times that of reference KDP.
- The grown crystal exhibits a positive photoconductivity.
- Hence, title compound is suitable for photonics and piezoelectric applications.

ABSTRACT

In present studies, we have successfully grown γ-glycine single crystal in the presence of $ZnSO_4$ as an additive by using slow solvent evaporation method. Powder X-ray Diffraction study confirms crystal grown in γ-phase and it crystallizes into a hexagonal structure with a space group of $P3_1$. UV–Visible transmittance spectra was recorded for the sample to analyse the optical transparency in visible and near infrared region (NIR). In Kurtz-Perry powder test, SHG efficiency of the grown $ZnSO_4$ added glycine crystal is found to be 3.18 times higher than reference KDP crystal. The dielectric constant and dielectric loss of $ZnSO_4$ added glycine crystal was carried out as a function of temperature by varying the frequency and the obtained results were discussed. The photoconductivity study confirms the positive photoconducting nature of grown $ZnSO_4$ added glycine crystal.

Keywords: *Glycine; XRD; NLO; Dielectric; Photoconductivity;*

1. INTRODUCTION

Last few years many inorganic materials discovered for Nonlinear Optical (NLO) applications. However, its laser damage threshold and nonlinear optical coefficients are very low compared with organic and semi-organic NLO materials. Recently the researchers focused their attention on the growth of organic and semi-organic materials. The second harmonic generation (SHG) efficiency of the single crystals depends on various physical, chemical and optical properties, such as transparency, dielectric constant and second order nonlinearity. Presently amino acids based organic single crystals exhibit very high nonlinear optical efficiency compared to various inorganic single crystals [1-4]. New crystals which have high non-linear optical efficiency and high transmission in the entire visible and NIR regions are required for various device applications. In recent years, many efforts and achievements have been made to the research and design of highly efficient non-linear optical