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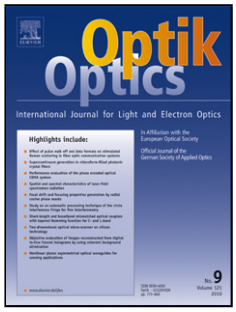

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Optical and electrical analysis of Cu^{2+} ion doped zinc thiourea chloride (ZTC) crystal: An outstanding 30×24×4 mm^3 bulk monocrystal grown from pH controlled aqueous solution

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Abstract

The present investigation is aimed to grow the bulk crystal and investigate the UV-visible, photoconductivity, and dielectric properties of Cu^{2+} ion doped zinc thiourea chloride (ZTC) crystal. For bulk growth, the most commercial slow evaporation solution technique has been adopted and a 30×24×4 mm^3 bulk single crystal of Cu^{2+} ion doped ZTC material has been grown by controlling the pH of aqueous solution. The doping of Cu^{2+} ion in ZTC crystal has been confirmed by energy dispersive spectroscopic technique. The assertive influence of Cu^{2+} ion on optical transparency of ZTC crystal has been ascertained in the wavelength range of 200-900 nm. The vital optical constants such as extinction coefficient, reflectance and refractive index have been evaluated using the transmittance data. The negative photoconductivity nature of Cu^{2+} ion doped ZTC crystal has been evaluated in the voltage range limited up to 100 V. The frequency and temperature effect on response of dielectric constant and dielectric loss of Cu^{2+} ion doped ZTC crystal has been exclusively investigated. The obtained results were integrated to discuss the benefits and utility of grown crystal for advanced technological device applications.

Keywords: Crystal growth, Optical studies, Dielectric studies, Photoconductivity

1. Introduction

Recent technological advancement in photonics and optoelectronics industry has transcended a worldwide protocol for development of new and efficient nonlinear optical (NLO) single crystals. Owing to the high utility in industrial applications the NLO crystal are seeking more and more demand [1-3]. The NLO materials comprise a large family of crystals which are currently under extensive focus to dwell the characteristics properties decisive for distinct applications. Amongst the lot many NLO crystals the semiorganic crystals grabs the attention of large fitarnity of researchers owing to their versatile and diverse nature. Few worth mentioning

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