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The field of nonlinear optics (NLO) is understood to encompass those phenomena in which the electric polarization strongly depends on the higher-order terms in a power expansions of the electric field intensity i.e., it does not just represent a simple linear dependence on the electric field intensity.

Second harmonic generation (SHG) was the first nonlinear optical effect observed in which a coherent laser input generated a coherent output. But nonlinear interaction of light with matter and includes problems such as light-induced changes of the optical properties of a medium. Each nonlinear optical process consists of two steps. The intense light first induces a nonlinear response in a medium and then the medium in which it is reacting, modifies the optical fields in a nonlinear way. Other NLO effects are third, fourth and fifth harmonic generation, optical parametric oscillation, linear and quadratic electro-optic effects, acousto-optic effect, stimulated Raman scattering and self-focusing of light.

In recent years, many significant achievements have been realized in the field of nonlinear optics because of the development of laser technology and new nonlinear optical materials of semi organic types. Being, the dopant EDTA, a hexadendate ligand, it was planned to grow and study the properties of some ethylene diamine tera acetic acid (EDTA) doped with zinc sulphate hepta hydrate, lithium sulphate monohydrate and copper sulphate penta hydrate and also amino acid of Aloe Barbadensis Miller mixed with potassium dihydrogen phosphate and lithium sulphate monohydrate.
Only a few earlier reports are available for the former case and nothing for the latter case. Hence, these materials have been chosen for the present investigation. The title compounds were grown at moderate cost, from the aqueous solution, employing slow evaporation of the solvent at ambient temperature. The single crystal X-ray diffraction data confirm the structure of the title materials. Powder XRD studies were carried out to study the crystalline nature. FT-IR spectra reveal the functional groups of the grown crystals. The recorded UV-Vis-NIR spectra of the title materials indicate a good transmittance in the entire visible and near IR regions suggesting the suitability of the materials for various optical applications in general and NLO application in particular. The thermal stability has been established by TG/DTA and DSC thermal analyses. The sharp endothermic peaks in the DTA thermo gram of the materials ensure the purity of the crystals of the title materials. The mechanical stability of the title materials have been established by Vicker’s micro hardness test. The etching and scanning electron microscope (SEM) studies indicates the perfection of the grown crystals. On the confirmational part, TLC, HPLC, NMR and colourimetric estimation techniques are also carried out.

In the present work, crystals were grown from slow evaporation solution growth technique at room temperature. In future, the efforts can be made to grow crystals by using mixed solvent method and different growth techniques. The study of the effect of annealing at different temperatures and growth parameters can be carried out. Optical characterization like higher harmonic generation, optical birefringence and laser damage threshold have to be done and an optical parametric oscillator can
be fabricated using these crystals. Dielectric studies, high resolution XRD, inductively coupled plasma analysis can also be carried out for doped and undoped crystals. Fluorescence studies also to be carried out to find the defects in the crystals. Effects of mixed dopants on the material synthesis, growth aspects and also characterization of the grown crystals may be carried out to devise newer NLO crystals.