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Title: STUDIES ON THE GROWTH, OPTICAL, THERMAL AND MECHANICAL PROPERTIES OF L-GLUTAMIC ACID HYDROBROMIDE SINGLE CRYSTALS

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6 **STUDIES ON THE GROWTH, OPTICAL, THERMAL AND MECHANICAL PROPERTIES OF**  
7 **L-GLUTAMIC ACID HYDROBROMIDE SINGLE CRYSTALS**  
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14 **Abstract:**

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18 A semiorganic crystal, L-Glutamic acid Hydrobromide, (LGHB) was synthesized from aqueous  
19 solution by slow evaporation technique. The lattice parameters of the grown crystal were determined using  
20 single crystal X-ray Diffraction analysis. The functional groups were identified using Fourier Transforms  
21 Infrared spectroscopy. UV-vis-NIR spectral analysis showed excellent transparency in the visible and infrared  
22 regions. Thermo Gravimetric and Differential Thermal Analysis showed that the grown crystals are  
23 thermally stable up to 218°C. The Second Harmonic Generation conversion efficiency was investigated using  
24 Kurtz Perry technique. The mechanical strength of LGHB crystal was tested by Vicker's hardness tester. The  
25 grown crystal exhibits Reverse Indentation Size Effect (RISE) as the hardness value increases with increase in  
26 load. The elastic stiffness constant is calculated from the hardness value.  
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30 **Keywords:** Crystal growth, XRD analysis, Fourier Transform Infrared Spectroscopy (FTIR), UV-vis-NIR  
31 spectral analysis, Hardness, Thermo Gravimetric Analysis (TGA)  
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35 **1. Introduction**

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37 In the recent period, search for new nonlinear optical materials has escalated because of their  
38 applications like Second Harmonic Generation, frequency mixing, electro-optic modulation, optical parametric  
39 oscillation and devices such as optical switches, optical modulators, optical communications, optical data storage  
40 etc [1-4]. A wide variety of both organic and inorganic materials have been developed in search of new  
41 frequency conversion materials, specially in semiorganic materials, due to their large nonlinearity, high  
42 resistance, too large induced damage, low angular sensitivity and good mechanical hardness [5,6]. Amino acids  
43 are interesting organic materials for NLO applications as they contain zwitterions, a proton donor carboxyl acid  
44 (-COO) group and the proton acceptor amino (-NH<sub>2</sub>) group which create hydrogen bonds [7, 8]. The complexes  
45 made of organic material with inorganic acids and salts, enhance the optical property.  
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48 The family of amino acid crystals like Glycine [9] L-Arginine [10], L-Histidine [11], L-  
49 Threonine[12],L-Alanine[13],L-Valine[14], L-Cystine [15] L-Glutamic acid [16] have been subjected to  
50 extensive investigation that have wide application in the field of Nonlinear Optics.

51 Extensive research were carried out on Crystals of L-Glutamic acid hydrochloride[17], L-Glutamic acid  
52 Hydrobromide crystal [18,19] and L-Glutamic acid hydrochlorobromide [20,21] that have promising  
53 optoelectronic applications.  
54

55 In this paper, L-Glutamic acid Hydrobromide (LGHB) crystals were grown by slow evaporation  
56 technique at room temperature. Highly transparent optically good quality crystals were obtained. The grown  
57 crystals were subjected to X-ray Diffraction analysis, spectroscopic, thermal, SHG and microhardness studies.  
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59 **2. Materials and methods**  
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