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## Growth and Characterization of L-Phenylalaninium Acetate (LPAA) single crystals under Conventional method

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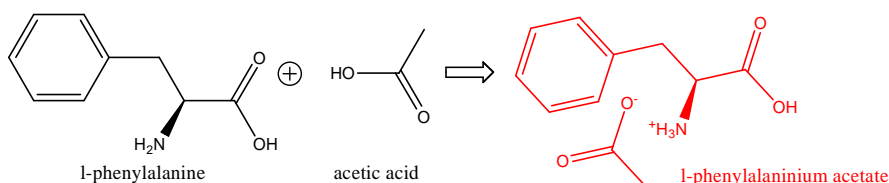
**Abstract:** L-Phenylalaninium Acetate single crystal was grown by conventional method. L- Phenylalanine and Acetic acid was taken in 1:1 ratio and dissolved in distilled water, the saturated solution was prepared by the magnetic stirrer, Then the solution was kept for controlled evaporation after 20 days the LPAA single crystals were harvested. The grown crystal was examined by Powder XRD, FTIR, UV, TG/DTA and Microhardnes test and the results were discussed. From the XRD the structure of the crystal and the parameters of the crystal were founded. From UV the transparency and the cut-off wavelength were calculated. The stability of the crystal was confirmed by TG/DTA analysis.

**Keywords:** L-Phenylalaninium Acetate; single crystals; conventional method; TG/DTA.

### Introduction and Experimental

In recent years researchers have identified amino acid based nonlinear optical crystals have nonlinear optical Properties, the wider choice of materials improved high non-linearity[1]. Organic crystals are currently of great interest for applications in the field of Communication technology owing to the tendency to replace classical Electronic materials with suitable organic compounds[2]. The importance of amino acids in NLO applications is due to the fact that all the amino acids have choral symmetry and Crystallize non centrosymmetric Space group. L-Phenylalanine is an essential amino acid commonly found in proteins. It has verity of important physiological roles to play [5-6].

#### Reaction mechanism:



LPAA\_solution was prepared from L-Phenylalanine and Acetic acid. The starting materials were taken in the stoichiometric ratio 1:1. The calculated amount of L-Phenylalanine and acetic acid were dissolved in distilled water and stirred for 5-6 hours to bring homogeneous solution. Then the solution was kept for

controlled evaporation at room temperature. The crystals were harvested after 20-25 days. Through the recrystallization process for 4-5 times we got 2 to 3 mm fine single crystals.

## Results and Discussion

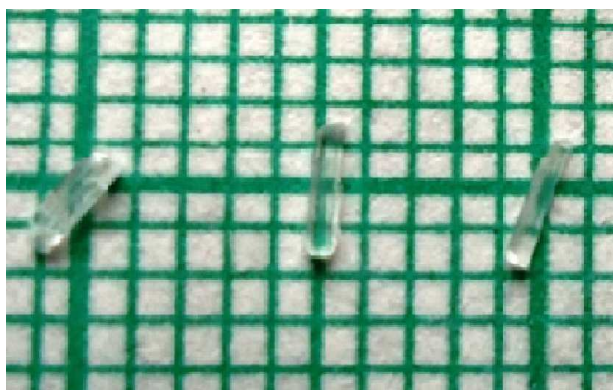
**Powder XRD-** The grown LPAA crystal is crystallizing in MONOCLINIC system With NON-CENTRO symmetric space group (P21). The lattice parameters are  $a = 13.13 \text{ \AA}$ ,  $b = 6.59 \text{ \AA}$ ,  $c = 10.28 \text{ \AA}$ .

**FT-IR-** FT-IR- spectrum was recorded in the range of  $400\text{--}4000 \text{ cm}^{-1}$ . The broad band between  $300$  and  $2300 \text{ cm}^{-1}$  is due to the Absorption of stretching of  $\text{NH}_3^+$  of the Amino acid salt. At  $1700 \text{ cm}^{-1}$  identifies the COOH and COO- groups of the compound. These vibrations clearly demonstrate the existence of L-Phenylalanine in its salt formed with Acetic acid.

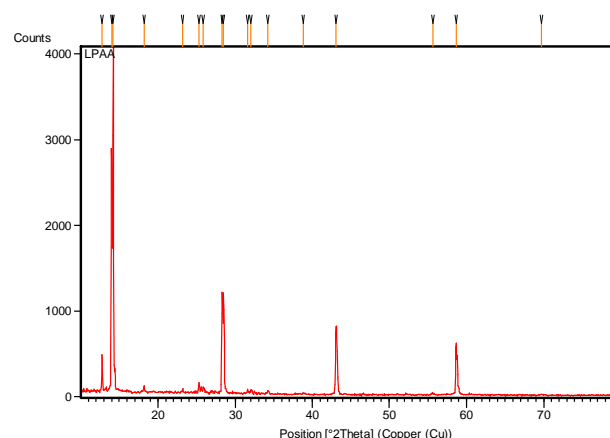
**UV-** This spectrum indicates that the grown crystal (LPAA) has a wide transparency window between  $400\text{--}1200 \text{ nm}$ . Lower cut-off wavelength  $210 \text{ nm}$ . The required properties for NLO activity are minimum Absorption and low cut-off. Energy Band gap is  $4.2 \text{ eV}$ . From the band gap it is confirmed that the grown crystal is an insulator.

**TG/DTA -** The material is stable up to  $190^\circ\text{C}$ . Two stages of weight loss is Absorbed. No residue is absorbed. The sharp exothermic peak shows the good crystalinity.

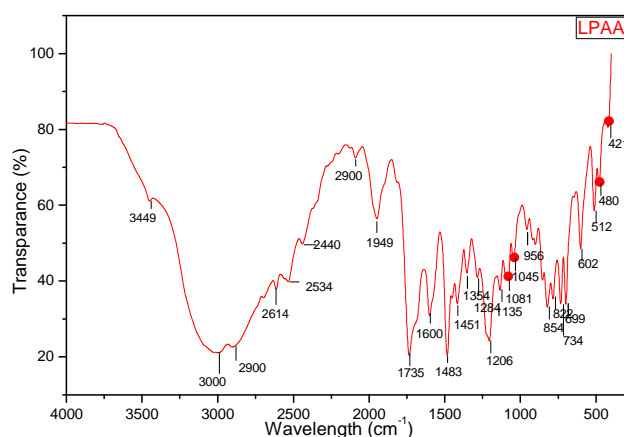
From all this analysis the grown LPAA crystal is an NON-CENTRO symmetric material with phase group P21. It has the wide transparency with the low cut-off. This all analysis are the evident for that the grown crystal is good for NLO applied device fabrication.



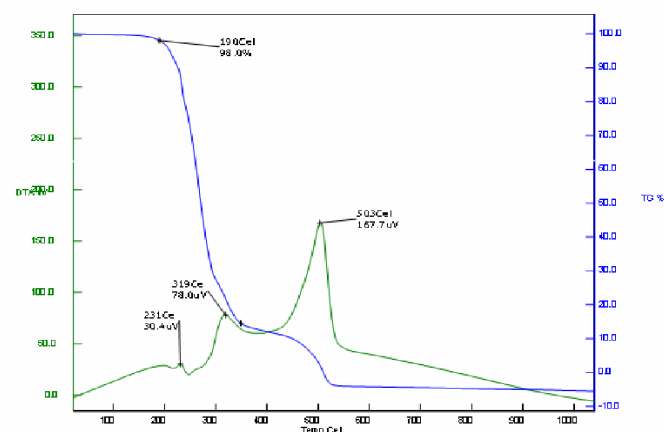
**Fig: 1** Photos of grown LPA single crystals



**Fig: 2** Powder XRD pattern of LPA single crystals



**Fig:3** FTIR graph for LPA single crystals



**Fig: 4** TG/DTA graph for LPA single crystals

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