



Growth and XRD, CHNSO, PL, Beam Displacement, Influx, Mass Spectral Characterization and Effect of LDT - Laser Fluence on L-Arginine Phosphate Monohydrate (LAPM) Crystals

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Abstract: L-Arginine Phosphate monohydrate (LAPM) crystals have copious applications in optical, opto - electronics and frequency response, phase matching and other applications... The XRD data denotes that crystal system is Monoclinic and parameters are a , b , c in Å as 10.851, 7.91, 7.321 and β is 98° and space group $P2_1$. The CHNSO analysis, influx and mass spectral data refers the elemental and crystalline parameters and analysis for the titled sample, the beam displacement for the nature of the crystal specifications and the luminescence study reveals that the excitation is in violet spectrum range. The fluence is measured by the effect of LDT.

Key words: XRD, CHNSO, LDT and beam displacement

I. Introduction

The anisotropic materials [1-7] are predominant over their counter parts by means of their focus and converging applications in academia, research and industrial utilities and here LAPM are applied for many fields based on their characterisation and utilities and are of NLO crystal [8,9 and 10] having harmonic generation and here the XRD, CHNSO, PL, Filter utility and LDT are discussed.

II. XRD

The LAPM crystals are analysed with XRD pattern and the lattice parameters are confined with a , b , c in (Å) and β and space group crystal system by the XRD data as shown in Table.1.

Table.1. XRD data of L-Arginine Phosphate monohydrate (LAPM) crystals

a	10.851 Å
b	7.91 Å
c	7.321 Å
β	98°
space group	$P2_1$
system	Monoclinic
Formula	$C_6H_{19}N_4O_7P$

III. CHNSO Analysis

The elemental composition of LAPM is determined using CHNSO analysis and is given in Table 2 with the theoretical values for CHNSO and matches on both the cases with the composition.

Table.2. Elemental representation by theoretical calculations and by CHNSO analysis

Elements	% by calculations	% by CHNSO Analysis
C	24.82	24.83
H	6.55	6.56
N	19.31	19.32
O	38.62	38.63
P	10.70	ND
Total: 290	100	89.34

ND as Not Detected

IV. Beam displacement

Filter applications by LAPM for displacement of beam in mm is given in Table 3 for which the displacement is measured with long wave as 1.289 mm and short wave as -0.547 mm and influx is 2.9668 micron for which NLO utility is leading.

Table.3. Beam displacement of crystals by filter method for LWP and SWP

plate level	Beam displacement (mm)
Long wave	1.289
Short wave	-0.547
plate	-0.785

V. LDT

The Filter LDT and laser fluence (optical energy per unit area) and % of LDT are measured for LAPM are given as BL long pulsed LASER with 1064 nm and power is 2 mW and pulse duration 15 ns and repetition rate as 100kHz and beam is of 20 microns and found that product is categorized as 1J/cm² rating with LASER fluence of 636.62 J/cm² and filter LDT as 2.45 J/cm² and the probability of damage is more.

VI. PL

The PL study of LAPM in the range 300–600 nm. A very strong emission peak occurs at 398 nm for the corresponding excitation peaks indicates that the LAPM crystal has violet fluorescence emission. The maximum intensity peak at 398 nm is attributed to $n-\pi^*$ transition and the band gap is 3.1176 eV for the LAPM crystals.

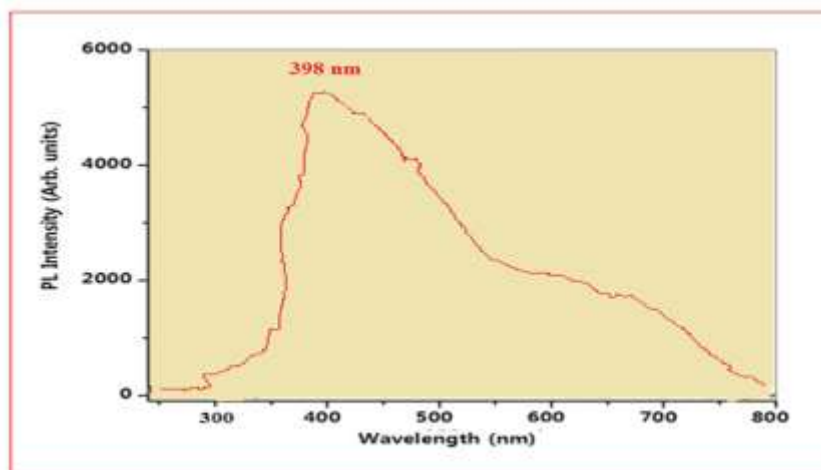


Fig.1 PL data of LAPM crystals

VII. Mass Spectrum

The Mass spectral data for LAPM is found to be 290 as per the abundance Vs m/z graph from mass spectrum and the fragmentation pattern is given in Fig.

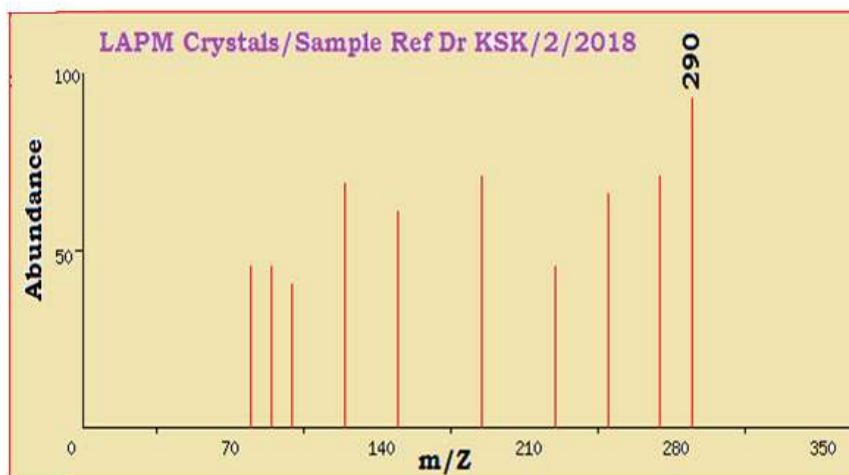


Fig.2 Mass spectral data of LAPM crystals

VIII. Conclusion

L-Arginine Phosphate monohydrate (LAPM) crystals have been grown by slow evaporation method. The XRD data represents that the crystal system is Monoclinic and parameters are analysed. The CHNSO analysis, influx and mass spectral data refers the elemental and crystalline parameters and analysis for the titled sample, the beam displacement for the nature of the crystal specifications and the luminescence study reveals that the excitation is in violet spectrum range. The fluence is measured by LDT as 636.62 J/cm².

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