International Journal of Pharmacy and Biological Sciences-IJPBS™ (2019) 9 (3): 201-203
Online ISSN: 2230-7605, Print ISSN: 2321-3272
Research Article | Biological Sciences | Open Access | MCI Approved
UGC Approved Journal

# XRD, Theoretical, CHNSO, Photo-Luminescence Crams of L-Arginium Semi Oxalate-LARSO Crystals

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Received: 22 Mar 2019 / Accepted: 24 Apr 2019 / Published online: 1 Jul 2019
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## Abstract
An organic NLO material of L-Arginium Semi Oxalate (LARSO) feel rights to the amino acid group was grown by the slow evaporation solution growth method at room temperature. As they are used to maintain metabolism and maintain them will equalise the fluid content and reduce stones and large sized single materials of LARSO were cultivated with dimension 43x16x10 $mm^3$ in 29-30 days. The grown material had been subjected to Photoluminescence study which reveals the violet light emission of LARSO and also the powder XRD characterization method to identify the peaks with the experimental and other data to give suitability and tangibility and identity of the grown LARSO material.

**Keywords**
L-Arginium Semi Oxalate (LARSO), Photo-Luminescence (PL), NLO material.

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## 1. INTRODUCTION
L –Arginium oxalate is an organic material has a sole opto-electronic property and has photoconductive, photo catalytic performance [1, 2]. The organic material has second order non liner optical (NLO-SHG) effects [3]. It is Zwitter ionic in nature and has large hyper-polarizability and nonlinear optical effect [4-7]. Literature survey reveals that to the best of our acquaintance, no PL study on LARSO is passed out. Thus, the PL study was done on LARSO.

## 2. SYNTHESIS
L-Arginine and Oxalic acid were taken in the molar ratio 1:1 and dissolved in deionized water to prepare an aqueous solution of L-Arginium Semi Oxalate

(LARSO). The solution was filtered using glass filter of 1micron porosity. The prepared solution was allowed to evaporate at room temperature for 29-30 days. After the saturation limit, the equilibrium of the solute was analyzed gravimetrically. Among the various amino acids, L-arginine is the simplest molecule having SHG efficiency of about one - third of the standard KDP material. Organic and semi-organic complex materials of L-alanine and L-histidine [7-9] are reported to be NLO materials, whereas less attention has been paid to characterize salts of L-arginine [9-12].

## 3. CHARACTERISATIONS

### 3.1 XRD DATA

The LARSO crystals are grown and analysed the lattice parameters by single crystal XRD data as shown below and found that the system is Monoclinic and the space group is $P2_1$ and the formula is $C_8H_{16}N_4O_6$ and molecular weight is 264.

The Table.1 gives the XRD data of LARSO crystals grown by slow evaporation method.

**Table.1 XRD data of LARSO crystals**

| | |
|---|---|
| a | 5.05 Å |
| b | 9.73 Å |
| c | 13.12 Å |
| β | 111.03 |
| system | Monoclinic |
| Space group | $P2_1$ |
| Empirical formula | $C_8H_{16}N_4O_6$ |
| $M_r$ | 264 |

### 3.2 PHOTOLUMINESCENCE STUDY

Photoluminescence commonly establish in compounds containing aromatic clusters with low-energy levels. *Photoluminescence* is the emission of light by a substance that has absorbed light. In most cases, the emitted light has a longer wavelength, and lower energy, than the absorbed radiation.

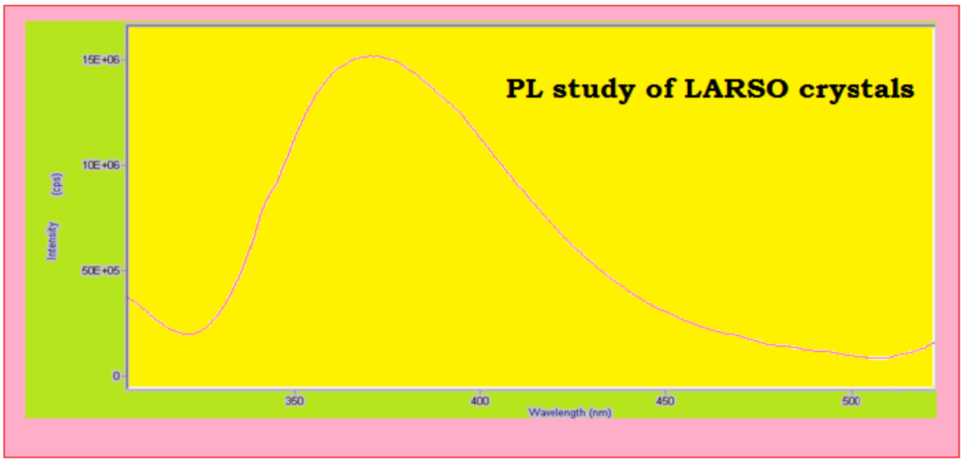


**Fig.1 PhotoLuminescence spectrum of LARSO material**

The Photoluminescence spectrum of LARSO was recorded in the range 300 – 500 nm. Here the spectrum given in **Fig.1** shows a peak at ~ 378 nm, the Band gap is 3.2826 eV and this indicates that LARSO Material has a violet Photoluminescence emission spectrum. By Photoluminescence spectrum, refrangibility is explained.

### 3.3 THEORETICAL, CHNSO DATA FOR LARSO CRYSTALS

The elemental analysis of the LARSO crystals grown is performed with CHNSO and by theoretical calculations and found to be matched using calculations and referred in Table.2.

**Table.2 CHNSO and Theoretical calculation of LARSO crystals**

| Elements $C_8H_{16}N_4O_6$ 264 | % by calculations | % by CHNSO Analysis |
|---|---|---|
| C | 36.36 | 36.37 |
| H | 6.07 | 6.06 |
| N | 21.21 | 21.21 |
| O | 36.36 | 36.35 |
| S | ND | ND |
| Total | 100.00 | 99.99 |

### 3.4 LDT & CRYSTAL FILTER DATA FOR BEAM OF LARSO CRYSTALS

The LDT of LARSO crystals is by the type as maxline 1 and CW laser of 1064 nm is used and power is 2mW and beam radius is 0.5 micrometer and 10 ns pulse width and fluence is $2.54*10^5$ W/cm$^2$ and damage may be probable for the range. Filter applications by LARSO for displacement of beam in mm is given in Table 3 for which the displacement is measured.

**Table.3. Beam displacement of crystals by filter method**

| plate level | Beam displacement (mm) |
|---|---|
| Long wave | 1.47 |
| Short wave | -0.63 |
| Compensation plate | -0.82 |

**As the displacement is a vector, the negative sign indicates that it is in opposite direction.**

## 4. CONCLUSION

The new organic NLO material L-Arginium Semi Oxalate (LARSO) was grown by slow evaporation process as they are for metabolism control. The PL study at room temperature reveals that the band gap is 3.2826 eV and also LARSO is violet Luminescence emitting material. The XRD study shows the proper identity of LARSO, theoretical and CHNSO analysis of LARSO portrays the elemental composition of LARSO and LDT specifies the probability of damage and filter data provides beam disarticulation of LARSO crystals.

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