**ABSTRACT**

**Introduction:** Crystals are meant for versatile applications and utility in all fields and mainly in electronic and biofields.

**Aim:** Our aim, the present investigation is focused on Bis Glycine Lithium Bromide Monohydrate (BGLBMH crystals), its synthesis and the various characterizations.

**Methodology:** BGLBMH Macro crystals are put in order by slow evaporation solution growth method and nanocrystal by milling method. The Single-crystal XRD, Powder XRD analysis, filter, anti-diabetic and anti-oxidant (AD and AO) studies were performed here.

**Result:** The single-crystal XRD study reveals the macro-crystalline lattice parameters with a, b, c in Å as 7.5397, 17.4174, 8.2727 and β as 118.14° as the system is monoclinic with a space group of P2₁/c. The macro and nano scales are analyzed for fluorescence spectral activity. The crystals speciality is THG and shows the SHG NLO value of 1.25 times that of KDP because of the strongest H bonds and the bandgap is 3.08 eV which is 403 nm as emission FL value for macro scaling and 397 nm for nano scaling with a bandgap of 3.12 eV. The nano outline of BGLBMH crystals is 250 nm and 34 nm correspondingly for the initial and final one.

**Conclusion:** The BGLBMH have good scope for anti-diabetic by the Glycine, bromide presence and have increased in inhibition as concentration increases and the IC value as 37.5 for macro and in a nano form, it is 30.4. Also, the AD - nm variations will have good efficiency when the size of the sample decreases from 250 to 34 nm. The BGLBMH macro and nanocrystals are used in filter applications also as the data are represented and concluded with the inferences and reported with the utilities for electronic and pharma utilities.

**Key Words:** AD, AO, Crystals, Fluorescence, Influx, Nano

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**INTRODUCTION**

Complexes of glycine have recently attracted attraction due to their potential applications in ferroelectricity, dielectric properties and nonlinear optical properties. Nonlinear optical materials are very important for the current researchers due to their importance for producing the second and third harmonic generations. Single-crystal X-ray beam structure arrangement examination uncovers that the hydrated type of glycine lithium bromide takes shape in the monoclinic framework, with spacegroup P2₁/c. Fluorescence, filter utility and AD and AO work for BGLBMH macro and nano scalings.
EXPERIMENTAL

Synthesis
Bis-glycine lithium bromide (BGLBMH) salt was combined by dissolving Analar grade glycine and lithium bromide in a 1:1 proportion in double-distilled refined water as indicated by the accompanying response:

\[ \text{LiBr} + \text{CH}_2\text{NH}_2\text{COOH} \]
\[ \text{Li}^+[\text{CH}_2\text{NH}_2\text{COOH}]\text{Br}^- \]

The temperature of the arrangement was kept up at a consistent temperature of 52°C, and the BGLB salt was acquired by the dissipation of the dissolvable. The immaculateness of the salt was expanded by progressive recrystallizations by suitable solutions.

Crystal growth
BGLBMH crystals were developed, at first by slow evaporation was utilized to develop single crystals of BGLBMH at room temperature. A saturated solution of 250 ml was set up as per dissolvability information. It was kept in an undisturbed territory for evaporation to get fine crystals of BGLBMH.

RESULTS AND DISCUSSIONS

SXRD and PXRD studies and milling scheme
The Single-crystal XRD (SXRD) and Powder XRD (PXRD) for macro and nanocrystals of BGLBMH crystals are represented by data of SXRD by Table.1 and PXRD pattern by Fig.1 and macro crystals are of size as 13 x 7 x 5 mm³ and powder XRD pattern shows the indexed data of BGLBMH with the 2θ territory value extended from 10-80 degrees at a pace of 1°/min and the macro crystals are off with the crystalline system of monoclinic in nature and PXRD intensity from 0-100000 values and the different planes of reflections were regulated utilizing the product AUTOX93 and matched up with powder XRD pattern of the existing one with the earlier cases.

The nano scaling is obtained from milling the macro crystals using Milling type as Retsch mill for the time extent of above 40 hours with a milling swiftness of 250 rpm as given in Table.2 and the variations of time Vs nm scaling is given in Fig.2.

Table 1: Data of SXRD of BGLBMH crystals

| System   | Data              |
|----------|-------------------|
| a in Å   | 7.5397            |
| b in Å   | 17.4174           |
| c in Å   | 8.2727            |
| β        | 118.14°           |
| space group | P2₁/c        |
| system   | monoclinic        |
| Crystal size – macro scaling | 13 x 7 x 5 mm³ |

Figure 1: PXRD of BGLBMH crystals

Figure 2: Sample with time in h Vs size in nm of BGLBMH crystals.

Table 2: Milling of BGLBMH crystals for nano scaling

| Sample                      | Crystal Size |
|-----------------------------|--------------|
| BGLBMH nanocrystals after milling | 34 nm       |

Fluorescence (FL) and NLO - SHG
Fluorescence (FL) is the practice of emanation of radiance by a particle after absorbing preliminary radiation (excitation level). Much of the time, the discharged light has a more drawn out frequency, and in this way lower vitality, than the assimilated radiation.

The bandgap is 3.08 eV which is the emission of 403 nm as emission FL value for macro scaling and 397 nm for nano scaling with the band gap of 3.12 eV. As the size of the sample from macro to nano of 34 nm, the FL value varies by 6 nm in decremented value and energy value varied by 0.04 eV as incremental one, the Fig.3 and Fig.4 represents the FL value for macro scaling and nano scaling for BGLBMH crystals.

The SHG of BGLBMH is analysed and from that, the crystal shows efficient output related to lasers for frequency dou-
bling and is of 1.25 times than the referenced specimen of KDP for the non-linear effect and is mainly due to the strongest hydrogen bond present in the specimen.

Anti-diabetic (AD) study and influx study
The Anti-diabetic (AD) studies for the grown BGLBMH crystals were carried out. The IC 50 values for macro and nano scales are 37.5 and 30.4 correspondingly for the AD of BGLBMH crystals and the inhibition values are increased as the macro is converted to nanoscale, which is suitable for AD work as mentioned in Table.3 and the graphical representation for macro and nano scaling is shown in Fig.5 as well as Fig.6-7.

The AD activity of BGLBMH is mainly due to the presence of Glycine and bromide and not due to the lithium by the chemical structure and properties. The cumulative column chart is shown in Fig.7 with a concentration in macro and nanoscale.

Influx value of 1.9752 microns of BGLBMH represents that the macro influx refers that BGLBMH is a good NLO crystal as it is less than 10 microns as the case represents the non-centrosymmetry and 2.4325 microns is a nano-level influx. So, the BGLBMH macro and nanocrystals are used in filter applications also as the data are represented in Table.4.

Figure 3: FL of BGLBMH crystals macro-403 nm.

Figure 4: FL of BGLBMH nano crystals-397 nm.

Figure 5: AD of BGLBMH macro crystals.

Figure 6: AD of BGLBMH nanocrystals.

AO-DPPH, FRAP and the total value of Antioxidant activity
DPPH radical explore ability assay represented is carried out [21]. DPPH outlines violet or the purple colour in methanolic solution and become lighter out to shadows of yellowish colour in the existence of antioxidants. 250µl of the test solution and 1ml of DPPH solution was added all along with 0.4 ml of 50 mM tris HCl buffer and the amount was made up to 2 ml with purified water and the tube was protected in dark arrangement for 0.5-1 h and the reading was measured at 517 nm using spectro-photometer of make LT 291 labtronics microprocessor. Ferric reducing capability of the extorts was explore using the potassium ferricyanide-ferric chloride technique. 1 ml of the extorts was assorted with 0.1M phosphate-buffered solution and also with 2 ml of the 0.1% potassium ferricyanide. The assortment was protected at 500°C for 0.5-1 h and 2 ml of the 10% trichloroacetic acid solution was supplemented to stop the effect, by centrifug-
gation at 5000 rpm for around 8 minutes the clear solution was estranged and added 0.1% FeCl₃ solution (2 ml) this was measured at 700 nm using a spectrophotometer. The total antioxidant activity of the trial was resolved by using the phosphor molybdenum process. The assay was mainly on the reduction of Mo (VI) to Mo (V) by the trial and succeeding creation of green phosphate composite at the value of acid pH. 0.2 ml trial was collected with 2 ml of reagent solution (0.6 M sulphuric acid, 28 mM sodium phosphate and 4 mM ammonium molybdate). The solution was protected at 90°C for 1.5 h. following the action of cooling in room warmth; the absorbance of the solution was measured at 695 nm using a spectrophotometer. The totality antioxidant action is articulated as the amount of gram equivalent of ascorbic acid as shown in Table.5.

### Table 3: AD of macro, nano BGLBMH crystals

| IC 50 values of macro BGLBMH | IC 50 values of nano BGLBMH |
|-------------------------------|------------------------------|
| 37.5                          | 30.4                         |

### Table 4: Influx of macro, nano BGLBMH crystals

| Influx          | Influx nano scaling |
|-----------------|---------------------|
| macro scaling   | 1.9752 microns      |
| nano scaling    | 2.4325 microns      |

### Table 5: AO of macro, nano BGLBMH crystals

| Samples       | % of DPPH for macro scale | % of DPPH for nanoscale |
|---------------|---------------------------|-------------------------|
| BGLBMH        | 34.44                     | 35.21                   |
| Samples       | % of FRAP for macro scale | % of FRAP for nanoscale |
| BGLBMH        | 17.6                      | 17.9                    |
| Samples       | Total antioxidant for macro scale | Total antioxidant for nanoscale |
| BGLBMH        | 43.0                      | 44.3                    |

### CONCLUSION

BGLBMH crystals are put in order by slow evaporation solution growth method and nanocrystal by milling method. BGLBMH are of the system as monoclinic with space group of P2₁/c by SXRD and the nano outline of BGLBMH crystals are reported for 34 nm likewise indexed by PXRD and crystals speciality is THG and band gap is 3.08 eV which is of 403 nm as emission FL value for macro scaling and 397 nm for nano scaling with the bandgap of 3.12 eV. Influx value of 1.9752 microns of BGLBMH represents that the macro influx refers that BGLBMH is a good NLO crystal and is 1.25 times than KDP, the non-centrosymmetricity and 2.4325 microns in nanoscale represents that it is good and better prospects in filter utility. The macro crystals have good scope for anti-diabetic by the Glycine, bromide presence and have increased in inhibition rate as concentration increases and the IC value as 37.5 and in a nano form, it is 30.4 and has good AD activity of BGLBMH crystals. Both macro and nano BGLBMH crystals are increased in inhibition values while concentration increases as shown in column chart and AO for BGLBMH is also analyzed and reported.

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### Declaration of interest statement & conflict statement

All authors are equally contributed and there are no conflicts to declare.

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### Author’s contribution

Alphonse Arockia Jenecius - Antioxidant study
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Irudaya Antonat Sophia - FL study and write up
Balaraman Ravindran - Overall corrections & suggestions
Ramamurthi Krishnaveni - AD work and write up

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