SHG detection on Glycine-Lithium Nitrate crystals

R. González Valenzuela, J. Hernández Paredes, H. Esparza-Ponce, M. E. Álvarez-Ramos, L.E. Regalado and A. Duarte-Moller

Equimolar amounts of Glycine (NH_2CH_2COOH) and Lithium Nitrate ($LiNO_3$) was dissolved on the double distilled water (about 20 ml) at room temperature for about 10 min. The samples were placed at the room temperature on separate petri dishes, allowing them to evaporate at slow rate [1].

Fig. 1 shows the optical microscopy image of the crystals formation. Sizes of almost 1 mm length in any direction could be observed. Besides, crystals of several millimeters length were reported on literature. The crystal shape showing an extended formation is similar by the ones reported and also, the sharp edges with particular angles can be seen in other publications [1]. NLO materials have a practical use only if they present a wide transparency state. To find this absorbance window, a Lambda 10 Perkin Elmer UV-Vis spectrometer was used. The scanning was done in the range of 200 to 1100 nm. An absorbance zone behind 250 nm (Ultra-Violet wavelength) can be observed, showing also a wide band completely clear in all the visible range and even more (infrared wavelengths). This means that this material presents a good non-absorbance band inside the visible range according to the desired situation due to the expected applications. It is important to observe a little protuberance around the 300 nm. However, this little peak is still outside the visible zone (UV zone), and it could present some absorbance if the crystal would be excited with 600 nm (red color) trying to obtain a second harmonic

of 300 nm (UV color). Fig. 2 displays the UV-Vis spectra. Figure 3 shows the X- Ray diffraction pattern. Within the graph appear the main peaks taken from database information of the alpha-Glycine, that is a Monoclinic crystal with lattice parameters (a=5.4621 Å, b=11.966 Å, c=5.1077 Å) and spatial group P21/n. This crystal structure and spatial group are found in the L- Argininum Dinitrate and Lithium p-nitrophenolate [2].

In order to find the SHG, the crystals was ground according to the Kurtz and Perry technique [3] into powder (about 70 µm) and densely packed between two transparent microscope glass slides. Once the samples are placed into the glass slides, a Nd:YAG Quanta ray INDI series laser of 1064 nm, generating an 8 ns pulse and operated at 6 mJ/pulse and at rate of 10 Hz is pumped at the proper angle and distance in order to see visibly the SHG on green color (532 nm); the expected emitted half wavelength signal. Afterwards, the green emitted light was photographed in order to evidence the double frequency emission or SHG shown at the Fig. 4

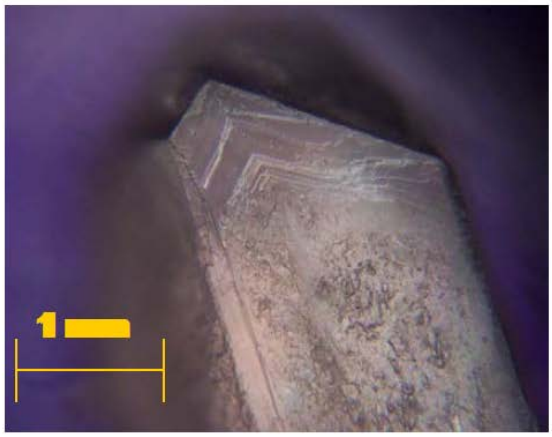

FIG. 1

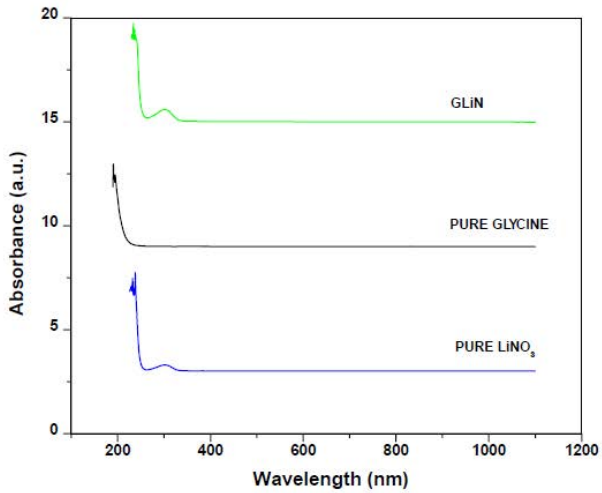

FIG. 2

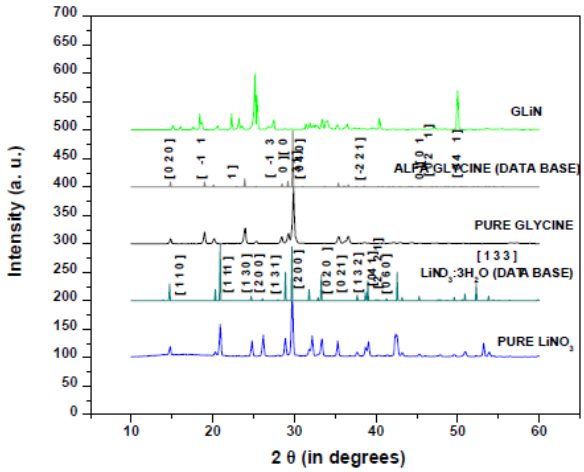

FIG. 3

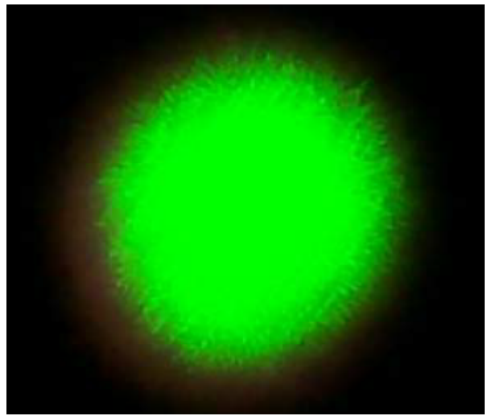

FIG. 4

References

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[3] B. M. Boaz, S. J. Das, Journal of Crystal Growth, 279 (2005), p. 383.