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Topic of Research: **Growth and Characterization of Anthracene, LTA and some other NLO single crystals**

Abstract

In single crystal form, solid materials are in most stable state and their properties can be well predicted or estimated in this form. Many useful properties get masked/ deteriorated or even completely die out if the material is not in its single crystal form. Therefore, single crystal form is an excellent foundation of modern technology. In a time of information and technology, the fast data retrieving, processing, transmission and high data storage capacity have compelled the researchers to look for some new nonlinear optical (NLO) materials having exceptional optical as well as other physical properties.

In search of new NLO materials, it is also very important to employ new growth techniques or to modify the optical, dielectric, mechanical and electrical properties etc. of materials by adding some functional groups or using dopants like: organic, inorganic and semi organic materials in the parent compound.

In view of this, we have selected Anthracene, L-Tartaric Acid (LTA) and ADP nonlinear optical materials for our present study.

We have grown the single crystals of anthracene by Vertical Bridgman technique (VBT) with controlled temperature gradient and LTA by slow evaporation solution technique (SEST) and tried to modify the optical, dielectric, mechanical and electrical properties etc. of these materials by making suitable changes in growth techniques. We

have analysed their good qualities by various characterisation techniques such as PXRD, FTIR, FT–Raman, Optical Transmission, Photoluminescence (PL), Thermal Analysis (TGA, DTA and DSC) and Vickers's micro hardness, respectively.

We further tried to modify the optical, dielectric, mechanical and electrical properties etc. of ADP by doping L-Proline (with different doping concentrations 1, 2.5, 5 and 7.5 mol %) and L-Tartaric Acid (with different doping concentrations 1, 2, 3, 4 and 5 mol %). Growth rate and consequent changes in the properties of ADP crystals due to these dopants are analyzed by above mentioned characterization techniques.

Important Findings

Anthracene crystal has moderate transparency in the range 385 to 1100 nm and its blue fluorescence emission indicates that it can be used as a blue laser.

LTA grown crystal has 85% transparency in the range 220 to 1100 nm that indicates, crystal is suitable for electro-optic modulation and NLO applications.

Solubility study of pure and LP doped ADP material shows an increase in solubility with increasing LP concentration. The optical transparency and crystalline perfection of ADP crystal was found to be maximum for 5mol% LP.

Solubility study of pure and LTA doped ADP material show a decrease in the solubility with increasing LTA concentration. The optical transparency and melting point of ADP was found to be maximum for 1mol% LTA.