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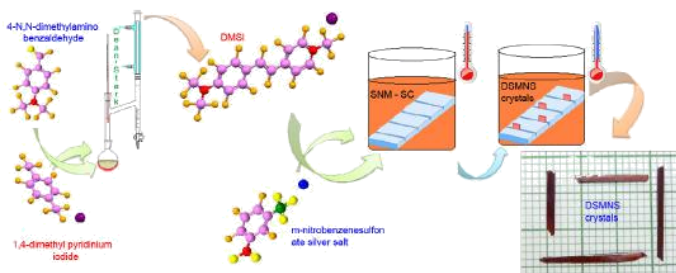
Bulk size crystal growth, spectroscopic, dielectric and surface studies of 4-N,N-dimethylamino-4-N'-methylstilbazolium m-nitrobenzenesulfonate (DSMNS): A potential THz crystal of stilbazolium family

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HIGHLIGHTS

- A potentially useful ionic organic NLO crystal of DSMNS is grown in bulk size.
- The growth is achieved by modified slope nucleation approach.
- A detailed FTIR and FT Raman spectral analyses is carried out.
- The NLO, thermal, dielectric and surface properties are reported.

GRAPHICAL ABSTRACT



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ABSTRACT

The synthesis and growth of a potentially useful and efficient nonlinear optical organic single crystal of 4-N,N-dimethylamino-4-N'-methylstilbazolium m-nitrobenzenesulfonate (DSMNS) is reported. The growth experiment involved the slope nucleation method coupled with slow cooling as well as slow solvent evaporation techniques. Single crystal X-ray diffraction (XRD), Fourier transform infrared (FT-IR), FT-Raman and nuclear magnetic resonance (NMR) techniques have been employed to ascertain the structure and composition of the crystal. Second harmonic generation (SHG) efficiency of the sample has been examined by Kurtz and Perry powder test. Thermogravimetry (TG), differential thermal analysis (DTA) and differential scanning calorimetry (DSC) techniques are employed to investigate the thermal behavior of the grown crystal. The frequency/temperature dependent dielectric properties of the organic crystal of DSMNS are studied. The surface features of the grown crystal are investigated by chemical etching study and atomic force microscopy (AFM).

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Introduction

The design and synthesis of organic materials for high second order nonlinear optical (NLO) effect has become a hot area of

research due to their widespread applications in the fields of optical signal processing, integrated photonics, optical switching, optical data storage, electro-optic modulation, spectroscopy and, terahertz (THz) wave generation and detection [1–4]. THz wave, being a non-ionizing source, its generation and detection assumes significance in the field of nonlinear spectroscopy and biomedical imaging [5,6]. Organic materials exhibiting large macroscopic

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