Bulk Crystal Growth

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Bandgap reduction of InP and GaSb epitaxial layers containing Bi

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We report on the growth of InPBi and GaSbBi epitaxial layers by liquid phase epitaxy. Photoluminescence measurements showed a bandgap reduction of 55 meV for InPBi and 24 meV for GaSbBi due to the incorporation of Bi in the III-V lattice.

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Growth and Characterization of ADP Single Crystals

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Ammonium dihydrogen phosphate (ADP) ($NH_4H_2PO_4$) is an interesting inorganic non-linear material with excellent optical properties and has numerous device applications. Single crystals of ADP was grown using slow evaporation technique using AR grade samples of ADP. The grown crystals were characterised and studied using UV- visible, FTIR spectroscopy and Dielectric studies. FTIR spectrum analysis confirmed the presence of functional groups of ADP crystals (between 400 to 4000 cm^{-1}). UV-visible study confirms that the crystals can be used for the non-linear applications. Dielectric studies confirm that the crystals grown are of high purity and single phase. Low evaporation method used here gives good quality crystals.

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Thermoelectric properties of the colloidal Bi_2S_3-based nanocomposites

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In this work we present the proof of the concept of the novel strategy to improve the thermoelectric properties of Bi_2S_3 based nanostructured bulk materials by blending the metallic nanoinclustions with the semiconductor nanoparticles forming the nanocomposites (NCts). The obtained NCts were composed of Bi_2S_3 nanorods (length - 100 nm and width – 10 nm) and Ag nanoparticles (diameter - 2-3 nm) synthesized by colloidal method. The morpohology, phase and chemical composition, electrical conductivity and Seebeck coefficient of NCts were investigated by using transmission electron microscopy (TEM), X-ray diffraction, energy dispersive X-ray analysis (EDAX), 4-point probes method and static dc-method. This strategy is the perspective way to improve the conversion efficiency of others thermoelectric materials.

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Structural and electrical properties of organic multicomponent salt of tetrabromoterepthalic acid with 4,4≠-bipyridine

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An organic multicomponent salt of tetrabromoterepthalic acid with 4,4≠-bipyridine (TBTA-BPD) has been synthesized via slow evaporation method. It has been characterized by elemental analysis, FTIR spectroscopy, thermal analysis, x-ray powder and single crystal diffraction technique. The supramolecular structure analysis reveals that the charge assisted N^+-H···O^- hydrogen bonding interaction between $TBTA^{2-}$ and BPD^{2+} forms 1D supramolecular chain which is further connected with guest water molecule through O-H···O hydrogen bonding interaction leading to formation of 2D supramolecular sheet. The electrical properties of TBTA-BPD have been studied by fabricating ITO/TBTA-BPD/Al sandwich structure. The current-voltage measurement of ITO/TBTA-BPD/Al configuration shows its Schottky behavior with a good rectification ratio of 19 at applied bias potential ± 1 V. The device shows low barrier potential of 0.66 eV and ideality factor of 2.97.

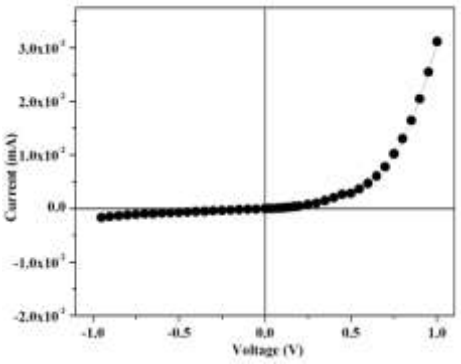

Fig.1: I-V plot of TBTA-BPD

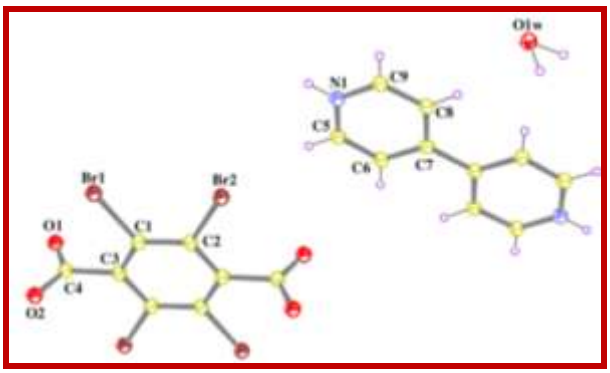

Fig. 2: Ortep diagram of TBTA-BPD