

Synthesis and Characterization of Un-Doped and Velvet Tamarind Doped ZnS Crystals, Using Sol Gel Method

Authors : Uchechukwu Vincent Okpala

Abstract : Under the Sun, energy is a key factor for the sustenance of life and its environment. The need to protect the environment as energy is generated and consumed has called for renewable and green energy sources. To be part of this green revolution, we synthesized and characterized undoped and velvet tamarind doped zinc sulfide (ZnS) crystals using sol-gel methods. Velvet tamarind was whittled down using the top-down approach of nanotechnology. Sodium silicate, tartaric acid, zinc nitrate, and thiourea were used as precursors. The grown samples were annealed at 105°C. Structural, optical, and compositional analyses of the grown samples revealed crystalline structures with varied crystallite sizes influenced by doping. Energy-dispersive X-ray spectroscopy confirmed elemental compositions of Zn, S, C and O in the films. Atomic percentages of the elements varied with VT doping. FT-IR analysis indicated the presence of functional groups like O-H stretching (alcohol), C=C=C stretching (alkene group), C=C bending, C-H stretching (alkane), N-H stretching (aliphatic primary amine) and N=C=S stretching (isothiocyanate) constituent in the film. The transmittance of the samples increased from the visible region to the infrared region making the samples good for poultry and solar energy applications. The bandgap energy of the films decreased as the number of VT drops increased, from 2.4 to 2.2. They were wide band gap materials and were good for optoelectronic, photo-thermal, high temperature, high power and solar cell applications.

Keywords : doping, sol-gel, velvet tamarind, ZnS.

Conference Title : ICAMN 2024 : International Conference on Advanced Materials and Nanotechnology

Conference Location : Tbilisi, Georgia

Conference Dates : October 03-04, 2024