

INVESTIGATIONS ON THE LINEAR, NONLINEAR, OPTICAL AND SURFACE STUDIES OF AN EFFICIENT ORGANOBIMETALLIC NOVEL NONLINEAR OPTICAL MERCURY CADMIUM THIOCYANATE CRYSTAL

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ABSTRACT

Nonlinear optical (NLO) metal organic single crystal of Mercury Cadmium Thiocyanate (MCTC) was grown by slow cooling method in aqueous solution. The crystal system and lattice parameters were determined from single crystal X-ray diffraction analysis. The experimental parameters based on single X-ray diffraction data of the crystal such as valence electron plasma energy, Penn gap, Fermi energy and electronic polarizability have been calculated. Field Emission Scanning Electron Microscope analysis reveals that the surface has minor defects with well defined growth patterns. The UV-Vis-NIR study of MCTC shows transparency in the entire visible region of the spectrum. The absorbance of MCTC crystal has been used to calculate the refractive index (n), the extinction coefficient (K) and the real and imaginary parts of dielectric constant (ϵ). Photoconductivity studies reveal the photoconducting nature of the sample. The AFM images confirm the formation of hillocks with cavities and smooth surface of the crystal. Thermal stability of the material was investigated by thermogravimetric analysis. Kurtz and Perry powder technique revealed the SHG property of MCTC and the efficiency was found to be 1.4 times higher than KDP.

KEYWORDS: Nonlinear Optical Properties, SCN Ligand, Photoconductivity, Surface Features