

# Poster Presentation

## Energy Band Gap and Dispersion Parameters in Ga<sub>2</sub>S<sub>3</sub> Thin Films

**Bayan H. Kmail**<sup>1,2</sup>, A.F. Qasrawi<sup>1</sup>

<sup>1</sup>*Department of Physics, Arab-American University, Jenin, West Bank, Palestine*

<sup>2</sup>*Directorate of Education Qabatia, Jenin, West Bank, Palestine*

*E-mail bayan.kmail@gmail.com, atef.qasrawi@aauj.edu*

### Abstract

The optical properties of the vacuum deposited transparent Ga<sub>2</sub>S<sub>3</sub> thin films are investigated by means of X-ray diffraction and UV-visible spectrophotometry in the incident light wavelength of 200-1100 nm. The X-ray diffraction revealed no patterns indicating the amorphous nature of the films. The Ga<sub>2</sub>S<sub>3</sub> thin layers are observed to exhibit a direct allowed electronic transitions energy band gap of 3.2 eV. The energy band gap contained a set of tail states arises from defects and structural deformations. In addition, the analysis of the dielectric spectra which is calculated from the reflection spectra permitted determination of the dielectric loss tangent, the oscillator and dispersion energies as well as the static and lattice dielectric constants. The difference between the mechanical lattice and static dielectric parameter is assigned to the free charge densities associated with the incident electric field excitation and due to the lattice mismatch between the sulfur and the gallium atoms in the Ga-S bond. The specified parameters are found to be sensitive to tetrahertz frequencies in the visible region of light which make it attractive for visible light communications.