

## Theoretical Analysis of the Solid State and Optical Characteristics of Calcium Sulphide Thin Film

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**Abstract :** Calcium Sulphide which is one of Chalcogenide group of thin films has been analyzed in this work using a theoretical approach in which a scalar wave was propagated through the material thin film medium deposited on a glass substrate with the assumption that the dielectric medium has homogenous reference dielectric constant term, and a perturbed dielectric function, representing the deposited thin film medium on the surface of the glass substrate as represented in this work. These were substituted into a defined scalar wave equation that was solved first of all by transforming it into Volterra equation of second type and solved using the method of separation of variable on scalar wave and subsequently, Green's function technique was introduced to obtain a model equation of wave propagating through the thin film that was invariably used in computing the propagated field, for different input wavelengths representing UV, Visible and Near-infrared regions of field considering the influence of the dielectric constants of the thin film on the propagating field. The results obtained were used in turn to compute the band gaps, solid state and optical properties of the thin film.

**Keywords :** scalar wave, dielectric constant, calcium sulphide, solid state, optical properties

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