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Comparative Refractive Index of Doped Tin Oxides Films by Modelling.

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Abstract:

The aim of this work is the determination of the optical parameters of pure and doped tin oxides film by modelling. This determination has been reached after the validation of our computational procedure by its application on known materials.

This procedure is based on the classical Drude–Lorentz model and the Kramers-Kronig analysis. The classical Drude–Lorentz model for the complex dielectric function ε is used to find the regions of integration of the Kramers-Kronig dispersion relation which is required to yield the spectral dependence of the optical properties of semiconducting materials. The optical constants as the high- and low-frequency dielectric constants ε_∞ and ε_{st} , the plasma frequency ω_p , collision frequency ω_τ , etc of pure and doped films are determined by fitting the photometric spectrum in the photon energy range varying between 0.3 and 4eV.

The obtained values from the fit are used to extrapolating the low and high frequency band of the non-measured spectral region of reflectivity. Kramers–Kronig method is used on the complex Fresnel reflection defined as $r = |r| e^{i\theta}$ to obtain unmeasured phase θ upon the measured amplitude function $|r|$. Results on refractive and extinction coefficient of elaborated layers are presented and comparison between results is achieved.