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Analysis of the Contribution of Drude and Brendel Model Terms to the Dielectric Function

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Abstract : Parametric modeling provides a means to deeper understand the properties of materials. Drude, Brendel, Lorentz and OJL incorporated in SCOUT® software are some of the models used to study dielectric films. In our work, we utilized Brendel and Drude models to extract the optical constants from spectroscopic data of fabricated undoped and niobium doped titanium oxide thin films. The individual contributions by the two models were studied to establish how they influence the dielectric function. The effect of dopants on their influences was also analyzed. For the undoped films, results indicate minimal contribution from the Drude term due to the dielectric nature of the films. However as doping levels increase, the rise in the concentration of free electrons favors the use of Drude model. Brendel model was confirmed to work well with dielectric films - the undoped titanium Oxide films in our case.

Keywords : modeling, Brendel model, optical constants, titanium oxide, Drude Model
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