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Glass Substrates

This note contains information related to procedures needed to determine the refractive index of uncoated glass substrates. The procedure is similar for other isotropic transparent substrates.

This information can then be used for subsequent analysis of coated samples using the same substrate.

Ellipsometer types	M-2000, RC2, alpha-SE
Software	CompleteEASE
Typical data required	Standard ellipsometric data at 2-3 angles between 50°-75°
Typical model required	Glass Substrate.mod
Considerations	Backside reflections

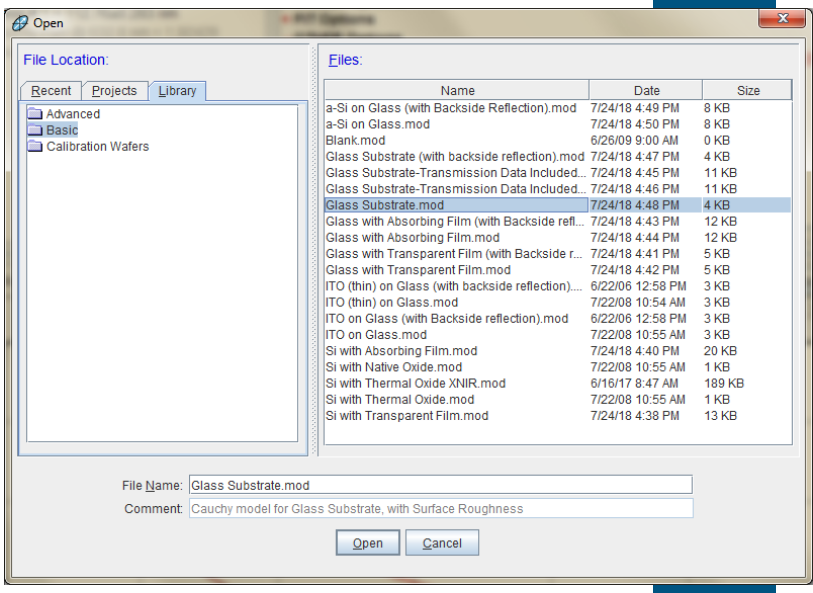
Backside reflections

For glass substrates, it is usually preferred to suppress backside reflection during measurement.

An easy way to suppress backside reflections from glass slides is to apply translucent tape to the backside. This works well for any substrate with n~1.5.

Other methods include roughening the backside or spatially separating the front and backside reflections (requires focused measurement beam and/or sufficiently thick substrate).

1. Measure sample or open saved data



2. Open “Glass Substrate.mod”

(From the **Model** panel, click ‘Open’. Browse the Library tab, Basic folder to find Glass Substrate.mod. Click ‘Open’ to load the model structure into the Model panel.)

This model includes:

-Cauchy equation for substrate

-Surface roughness

-NO correction for backside reflections

Layer Commands: Add Delete Save

Include Surface Roughness = ON Roughness = 0.00 nm (fit)

- Substrate = Cauchy Substrate
  A = 1.500 (fit) B = 0.0000 (fit) C = 0.0000 (fit)
  + **Urbach Absorption Parameters**

- **MODEL Options**
  Angle Offset = 0.00
  Include Substrate Backside Correction = OFF
  Model Calculation = Ideal

+ **FIT Options**

+ **OTHER Options**

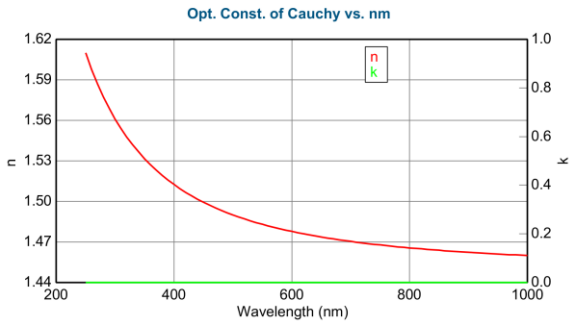
Configure Options

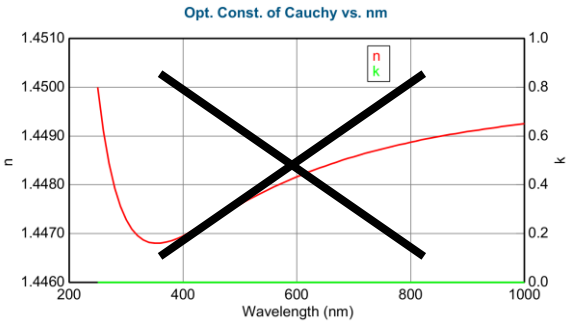
Turn Off All Fit Parameters

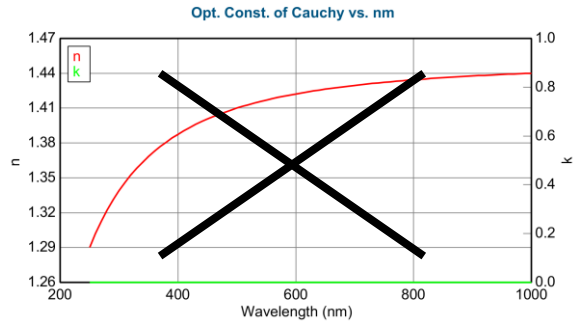
3. From the Fit panel, click ‘Fit’

4. Evaluate result by considering:

- Do the model generated curves visually match the experimental curves?
- What is the MSE value?
- Are the results physically reasonable?



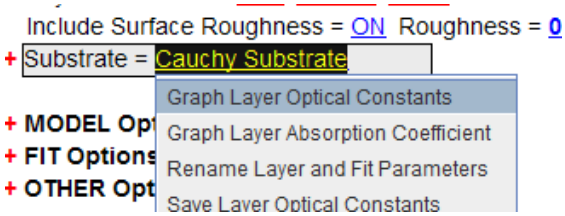




Normal Dispersion

Glass optical constants should follow normal dispersion, with index only increasing as wavelength decreases.

To view optical constants, right-click "**Cauchy Substrate**" and select "Graph Layer Optical Constants"



5. If results are acceptable, save the substrate optical constants for subsequent analysis of coatings on same substrate

To save optical constants, right-click "**Cauchy Substrate**" and select "Save Layer Optical Constants". Choose "Parameterized" for easier modification later if needed. Use Recent or Projects tab to locate desired folder.