



Thin Film Measurement solution
Software, sensors, custom development
and integration

CdS Measurement

CdS is used as a passivation layer in CIGS based thin –film solar cells. It is deposited on top of the absorber (CIGS) in the solar cell stack. Surface of the CIGS layer is very rough and, during on-product measurement ,only thickness of the CdS is, typically, determined using known optical constants data.

To determine optical dispersion of the CdS, two samples of the CdS on glass were prepared using same procedure as on product deposition.

MProbe VisNIR system (400-1700nm wavelength range) was use to measure these sample and the data was analyzed to determine thickness and n& k of the CdS layer.

CdS dispersion was represented using Tauc-Lorentz approximation to account for differences with standard library material. Light scattering effect from surface roughness was corrected using Kirchhoff scalar approximation and estimated roughness was determined from the measurement along with thickness and n, k values.

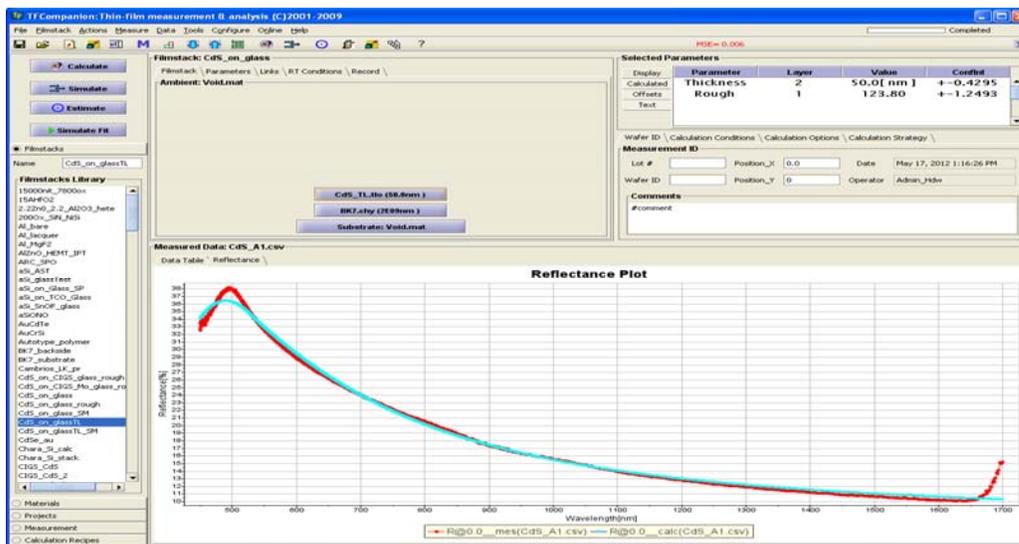


Fig. 1 CdS sample #1 the fit of the model to measured data. CdS layer thickness was determined as 50nm, surface roughness: 12 nm, dispersion (see Fig.2)

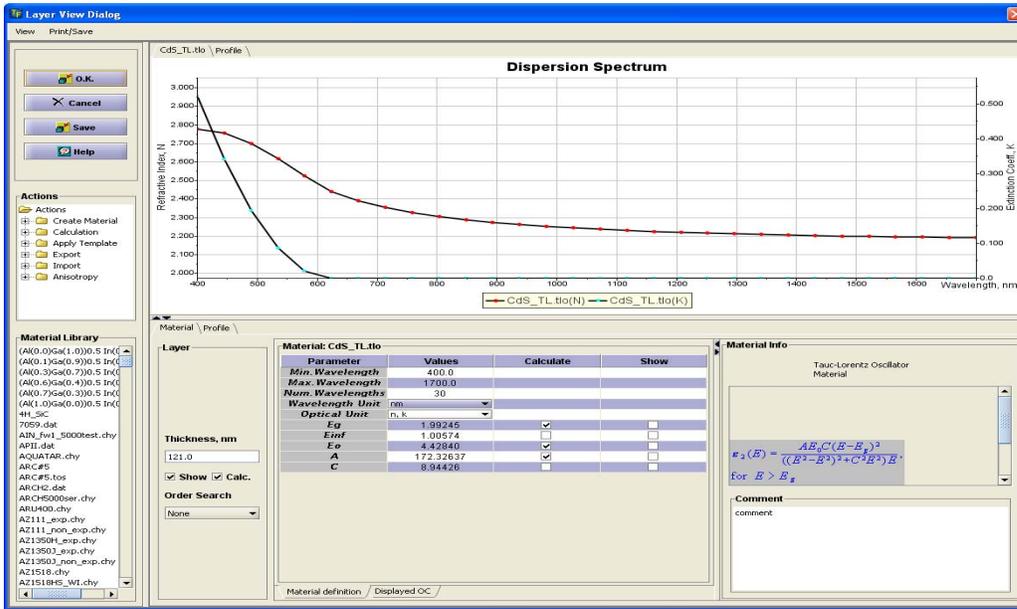


Fig. 2 CdS sample #1 dispersion determined from the measurement.

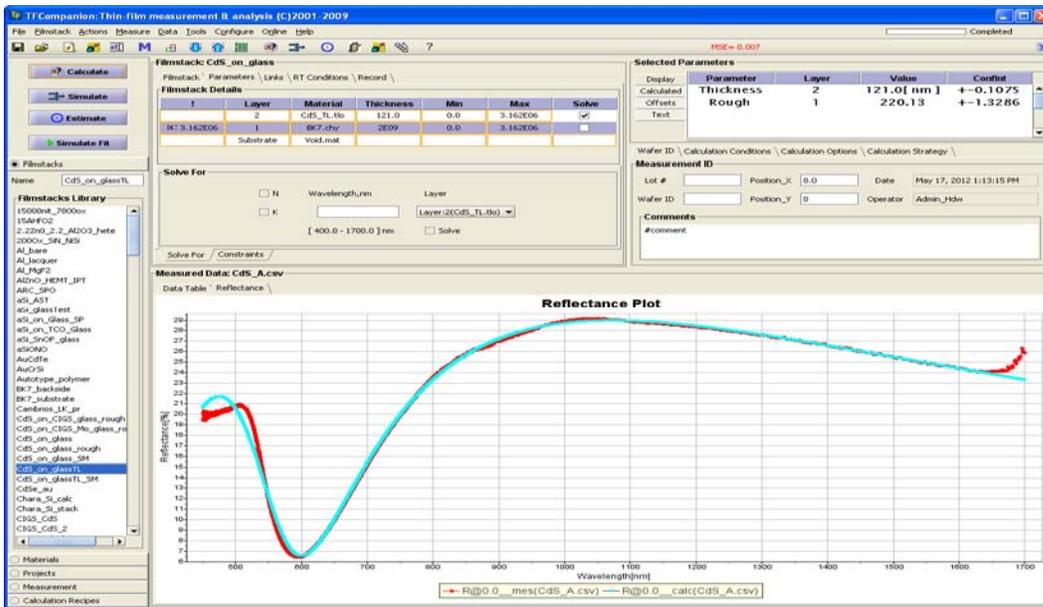


Fig. 3 CdS sample #2 the fit of the model to measured data. CdS layer thickness was determined as 121nm, surface roughness: 22 nm, dispersion (see Fig.2)

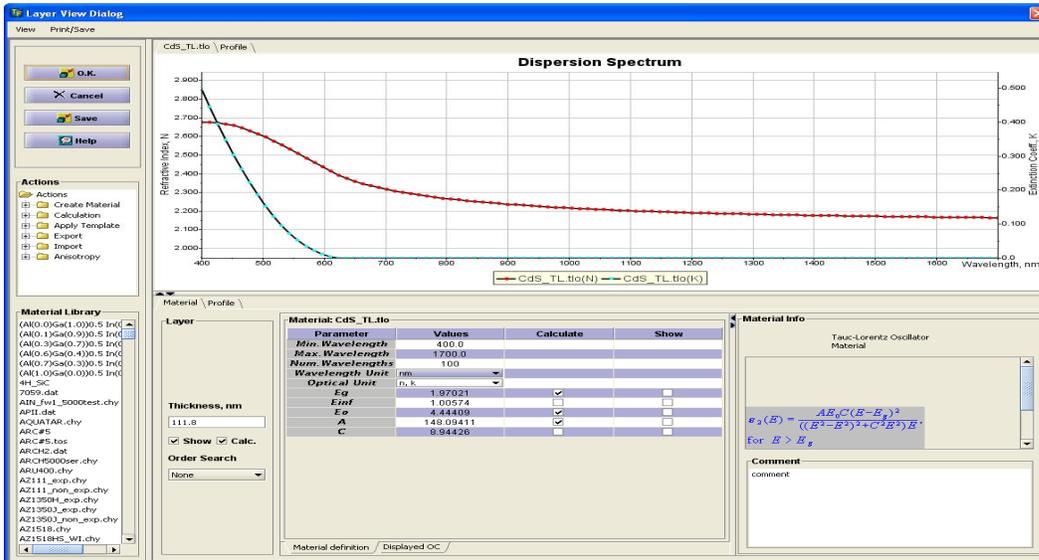


Fig. 4 CdS sample #2 dispersion determined from the measurement

CdS dispersion determined from sample #1 and #2 is almost identical with only minor differences.

The results were saved as a CdS material in the database for use for on-product measurement of the TCO/CdS/CIGS/Mo stack.