



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

Measurement of LT-N865 material (thin film)

MProbe UVVisSR system (200nm -1000nm wavelength range) was used to measure thickness and n&k of LT-N865($C_{38}H_{26}N_4$ - BmPyPhB) material. LT-N865 is an electron transport/hole blocking material manufactured by Luminescence Technology Corp (Taiwan) and is used in novel OLED devices. Material was deposited on a glass slide. Optical properties and/or thickness of the material were unknown.

Review of the raw reflectance spectra (Fig. 1) reveals some additional information that can be used in the data analysis:

1. Reflectivity is relatively low – similar to reflectivity of a bare glass (~ 4 – 5 %). This means that reflective index of the material is ~ 1.3 – 1.6 range.
2. There is an absorption edge at ~ 350nm. Additional transmittance measurement of the bare glass substrate (Fig.2) verified that the glass absorption is primarily responsible for this behavior.
3. The spectrum is smooth in the visible range – no fringes or curvature. Given the reflective index this indicates that the thickness should be <200nm
4. Sample material look milky, so there is some roughness and we need to factor in the effect of light-scattering.

Now we can use this information in construction of the model:

- a). To exclude the effect of the glass absorption the data was limited to 350-1000nm range.
- b). LT-N865 material optical constants dispersion in 350-1000nm range was represented using Tauc-Lorentz oscillator approximation. With starting values of $n \sim 1.5$ and $k < 0.1$
- c). Light scattering factor and backside reflection effect were added to the model.

Now we can accurately determine thickness, n&k and roughness by fitting the model to measured data. Fig. 3 show the fit of the model to measured data and Fig. 4 presents the optical constants dispersion determined from the measurement. Results of the measurement are summarized in the Table 1.

Point#	Thickness, nm	Roughness, nm
1	130 nm	25 nm
2	121 nm	24 nm
3	134 nm	26 nm
4	121 nm	28 nm

Table 1. Results of the measurement summary.

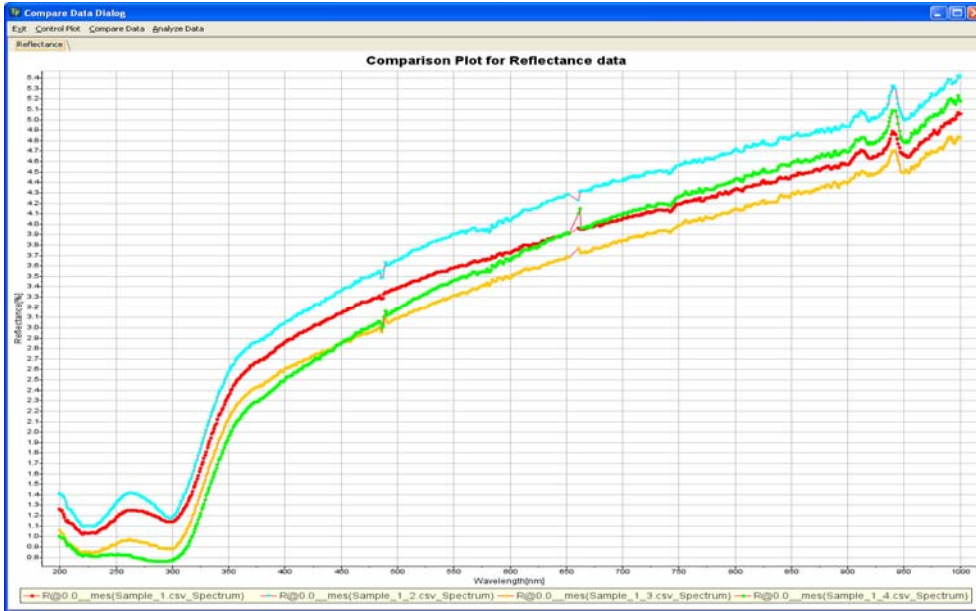


Fig. 1 Sample#1 Reflectance spectrum for 4 measurement points.
(Red –center point)

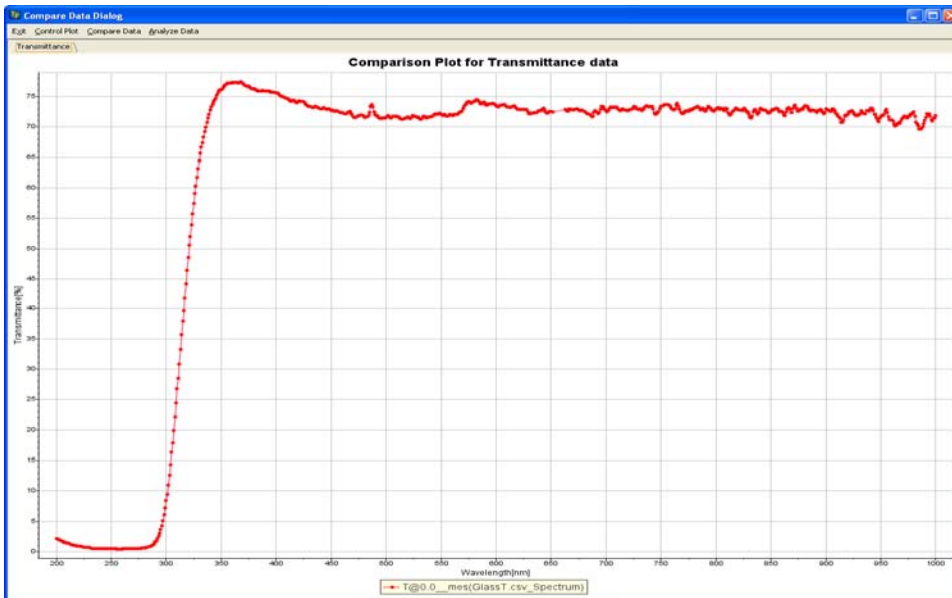


Fig. 2. Clear glass transmittance. Sharp absorption edge at ~ 350nm.

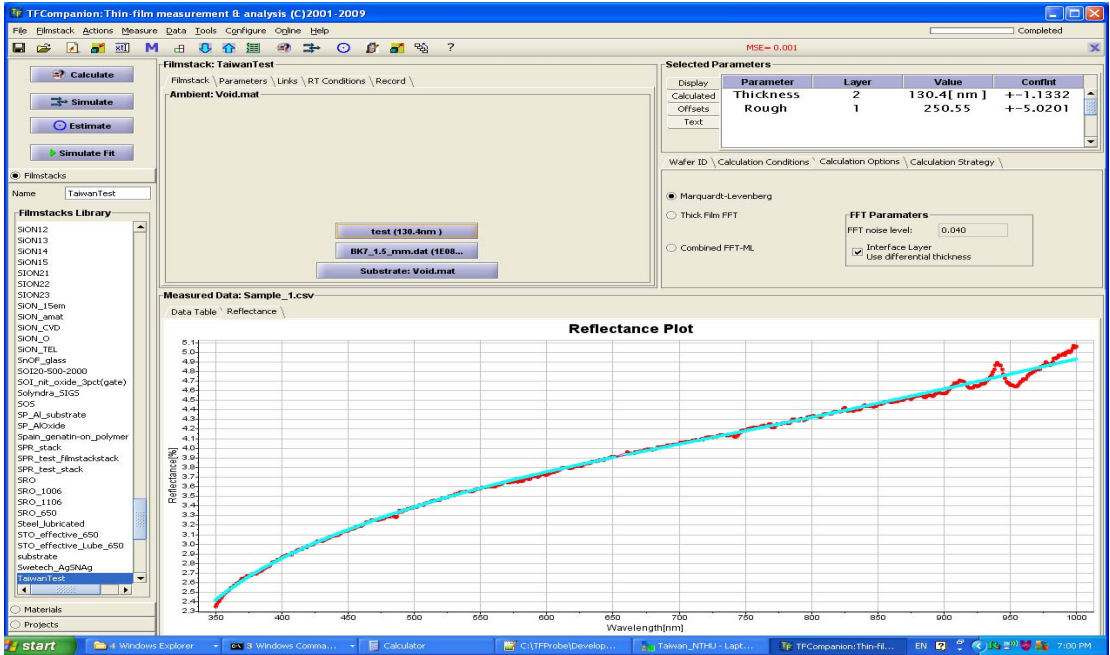


Fig. 3 Point#1 Fit of the model to measured data.

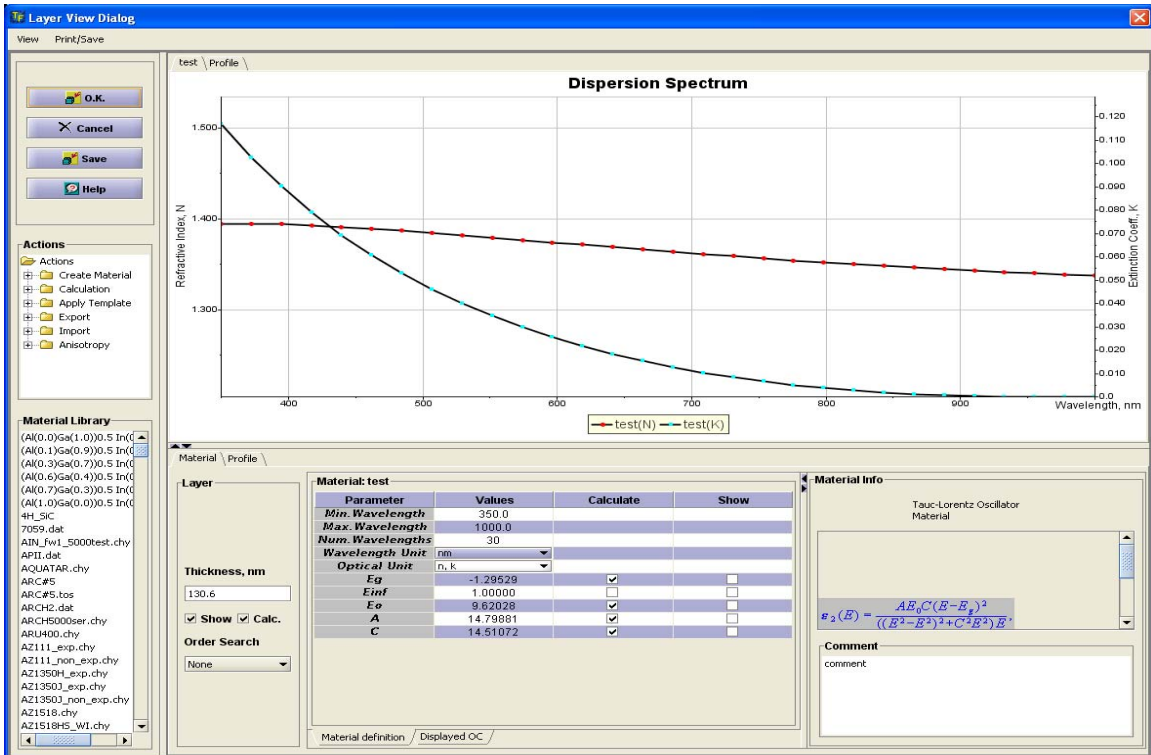


Fig. 4 n & k spectrum determined from the measurement