

OLED Metrology.

OLED structure is used in many applications from TV screen to cell phones. A typical OLED structure includes three thin organic layers sandwiched between electrodes: HTL(Hole-transport layer), EML (electron-mobility) or hole blocking layer and ETL (electron transport layer)

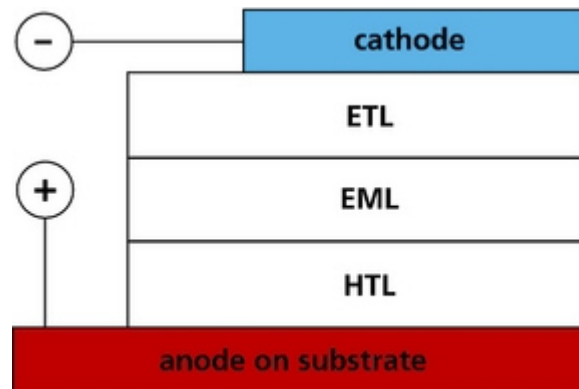


Fig. 1 Schematic structure of the OLED

The metrology of the thin films that make up the OLED structure is of critical importance. MProbe UVVis and MProbe UVVis-MSP offer an inexpensive, robust, non-contact metrology. Both thickness and optical constants of the materials can be measured.

MProbe UVVis allows measurement of the blanket (unpatterned) samples and MProbe UVVis-MSP enables measurement on the pixel level using very small spot size.

I. Measurement examples

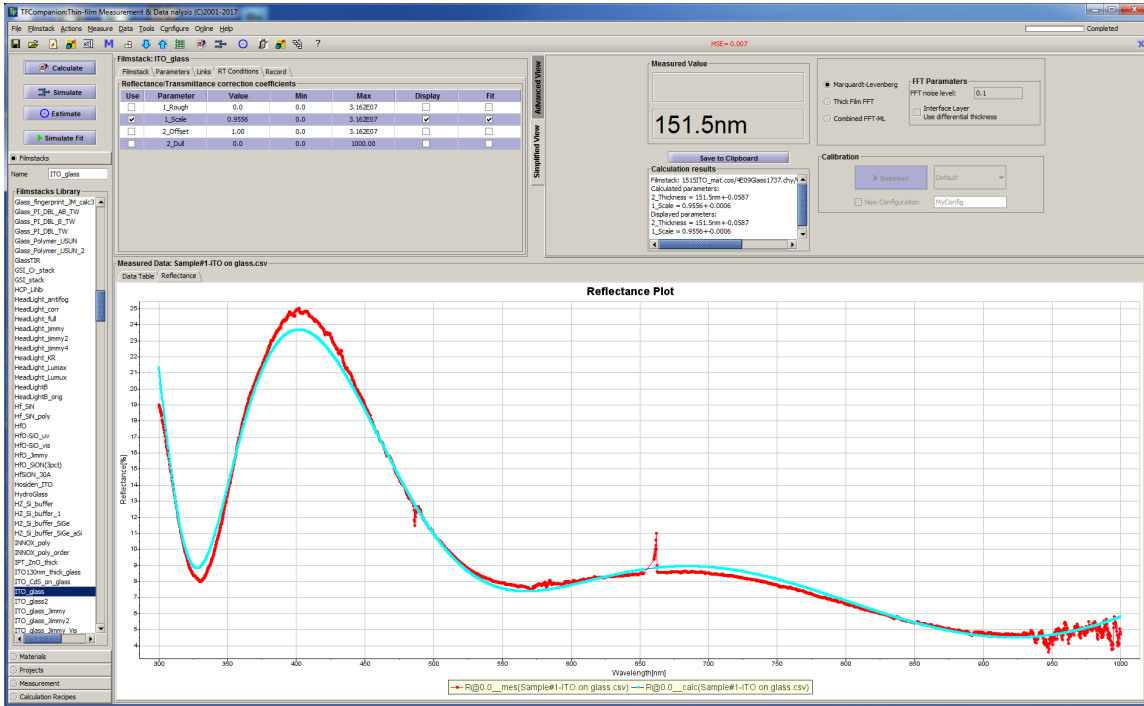


Fig.2 Measurement of the ITO (transparent conductive oxide) on glass – both thickness and optical constants are determined using parameterized ITO model.

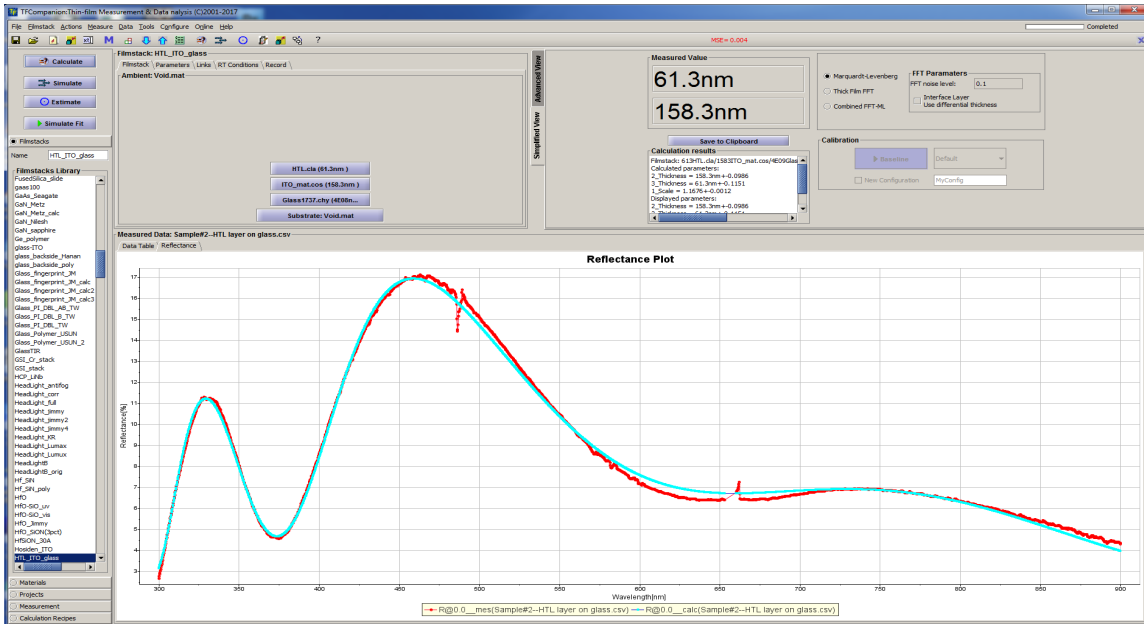


Fig.3 Measurement of the HTL layer on ITO – both ITO and HTL thicknesses are measured.

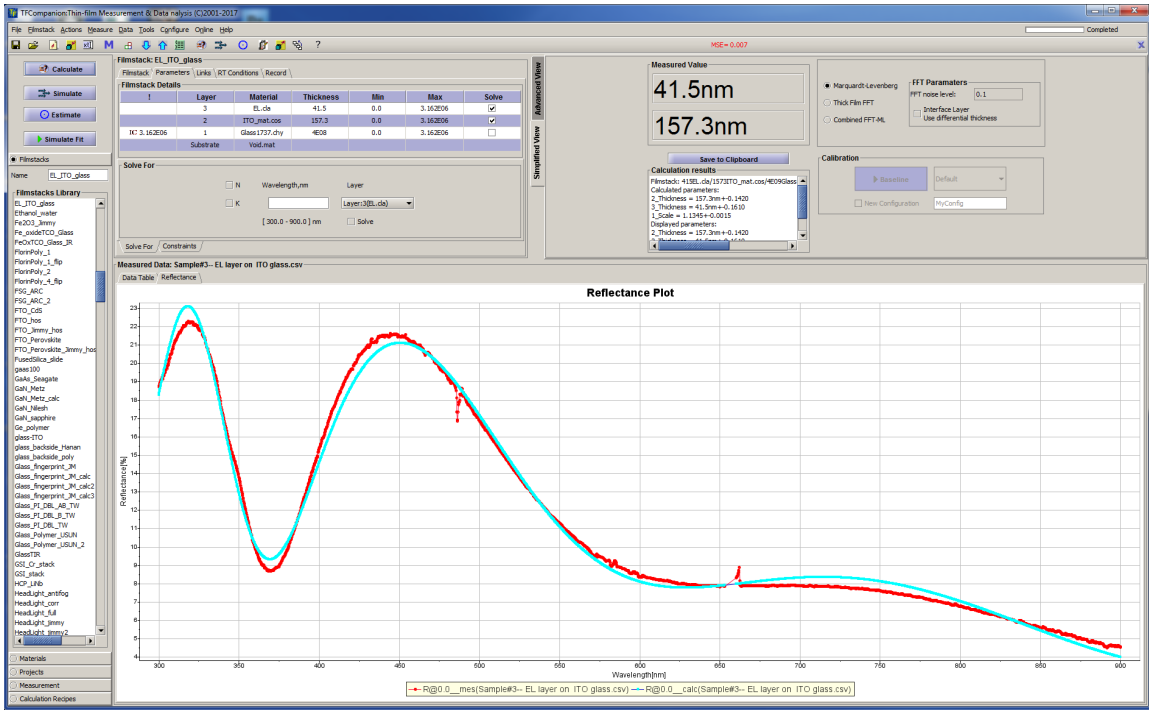


Fig. 4. Measurement of the EML layer on ITO – both ITO and EML thicknesses are measured.

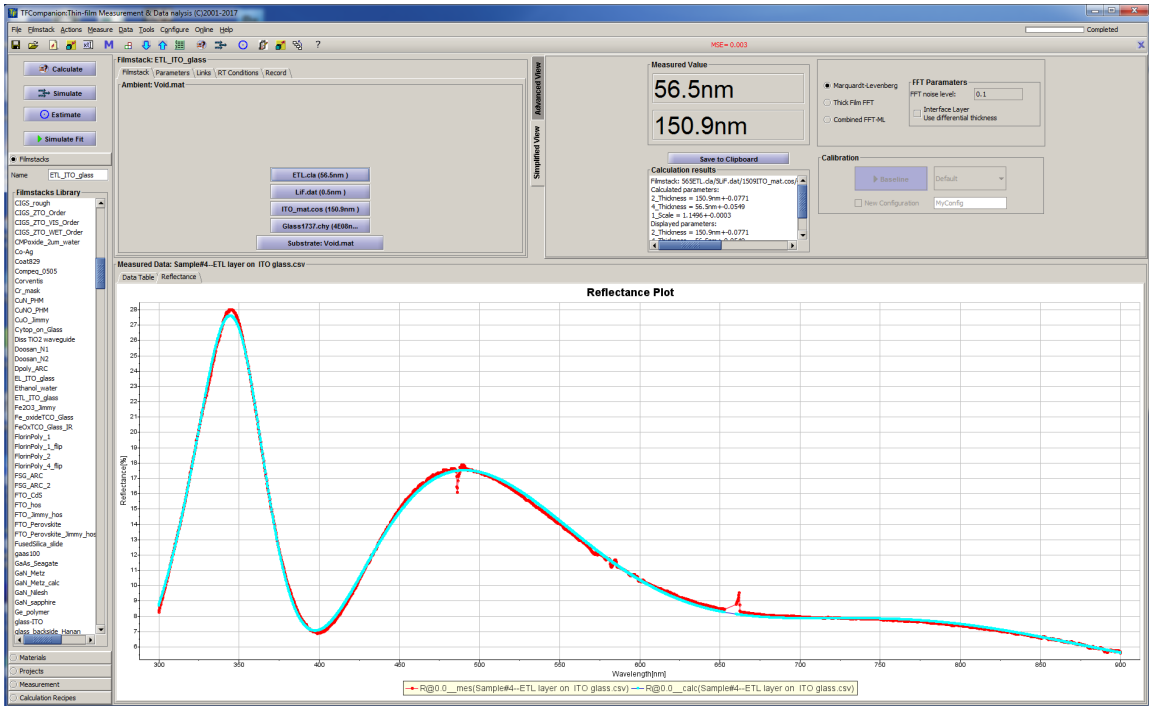


Fig. 5. Measurement of the ETL layer on ITO – both ITO and ETL thicknesses are measured.

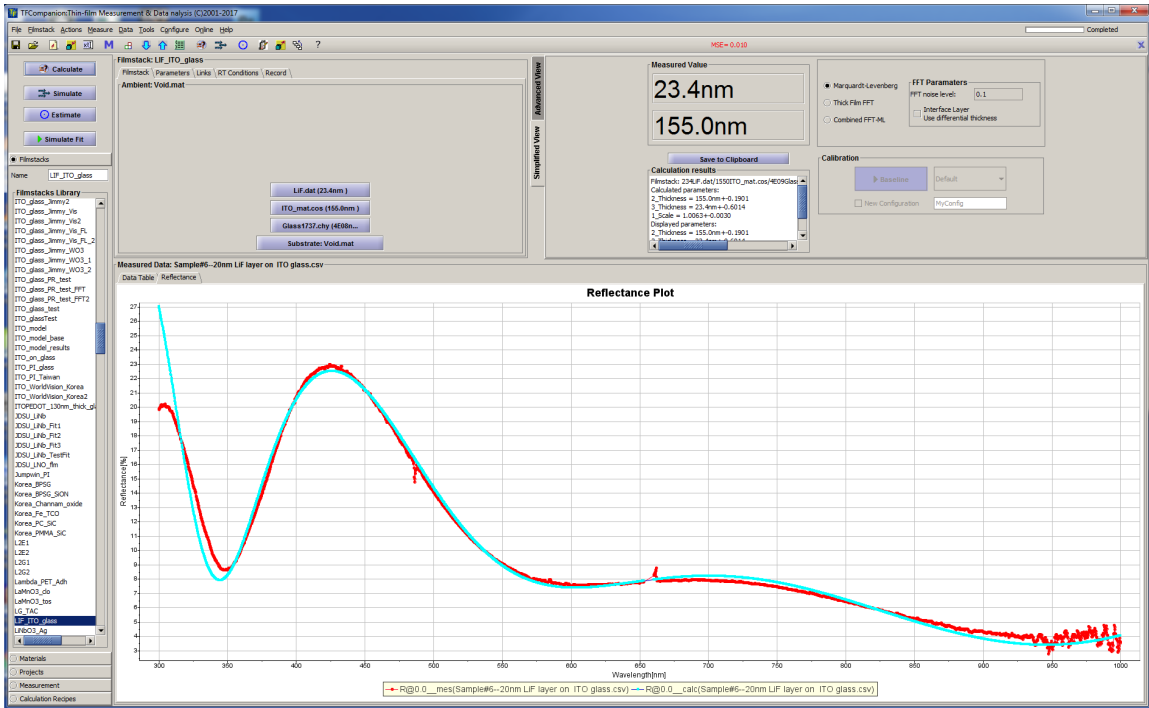


Fig. 6. Measurement of the LiF layer on ITO – both ITO and LiF thicknesses are measured.

II. Alq3 and NPD measurement examples

One of the promising implementations of the OLED uses NPD and Alq3 polymer materials. Both of these materials have an interesting electronics structure and optical properties depend on the preparation conditions. So, it is becoming especially important to measure optical constants dispersion along with the thickness.

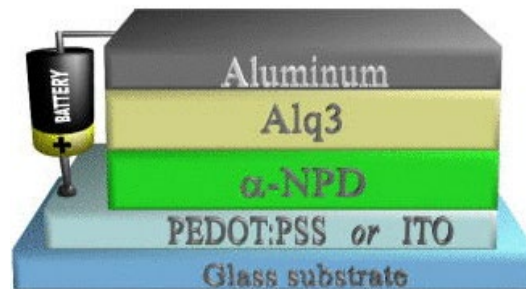


Fig. 7 OLED structure using Alq3 and NPD

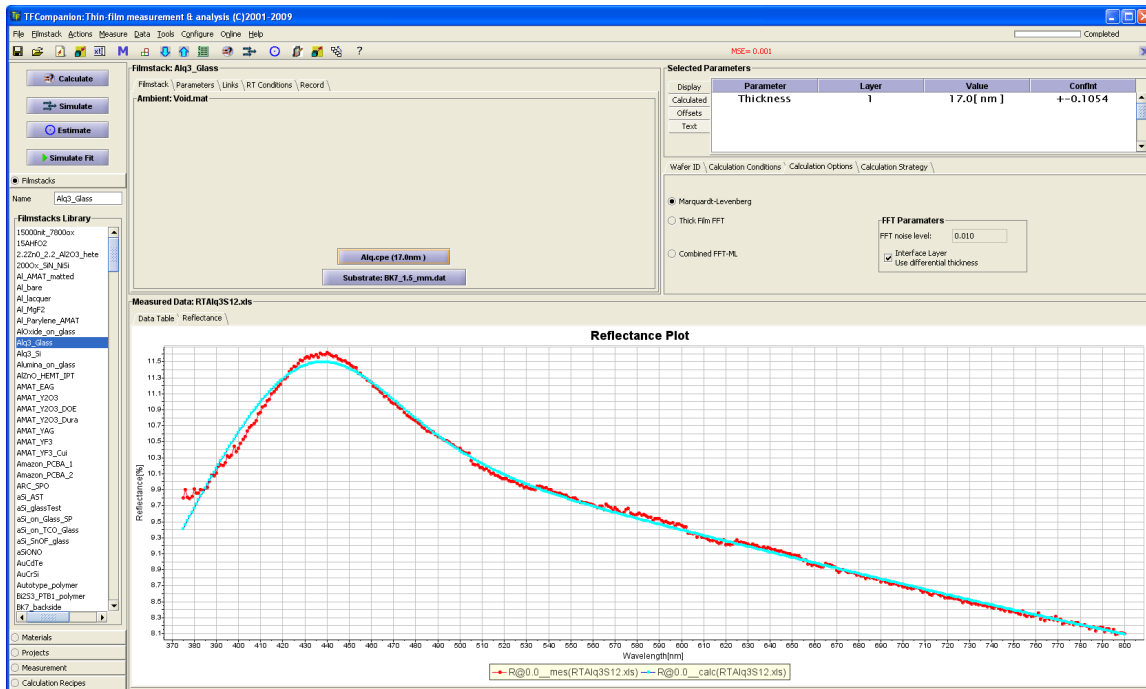


Fig. 8 Measurement of the Alq3 layer (17nm) on glass. Both thickness and optical constants are determined

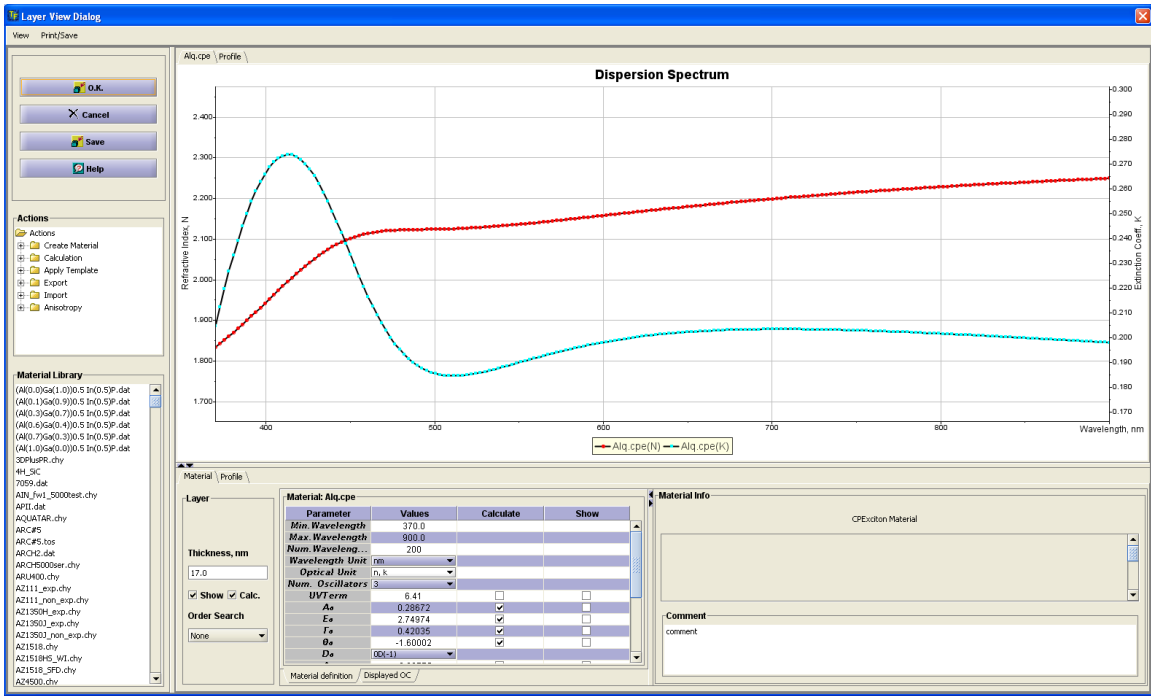


Fig. 9 Optical constants (n&k) of the Alq3 are determined from the measurement.

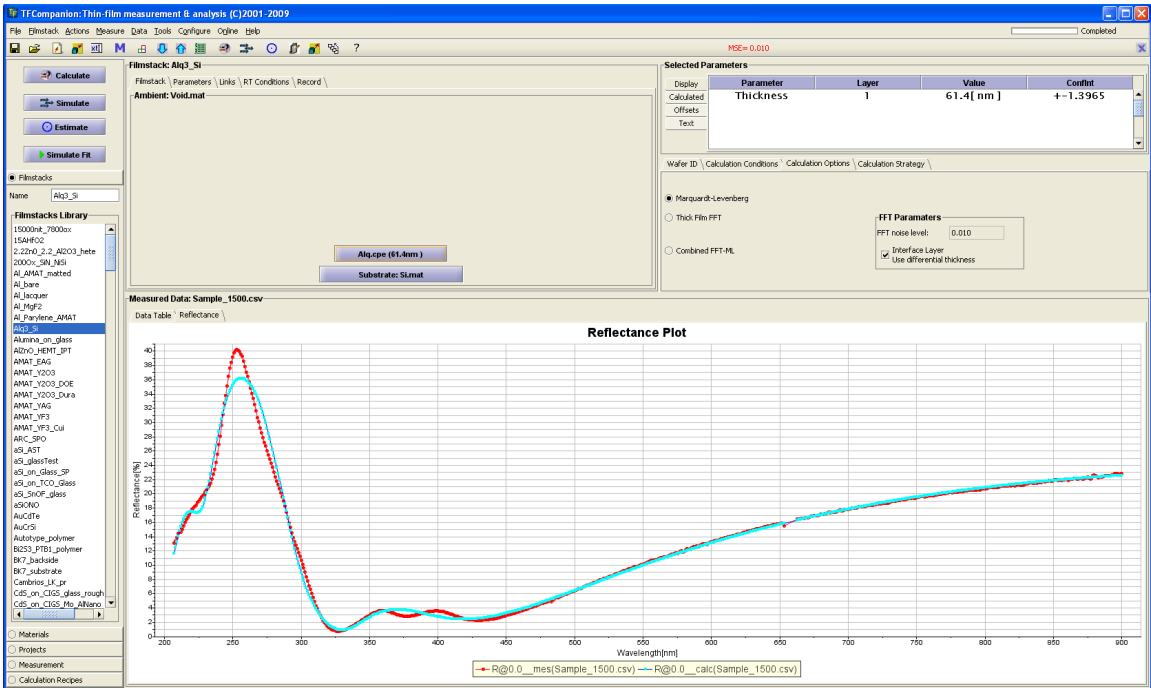


Fig. 10 Measurement of the NPD material on glass: thickness and optical constants are determined

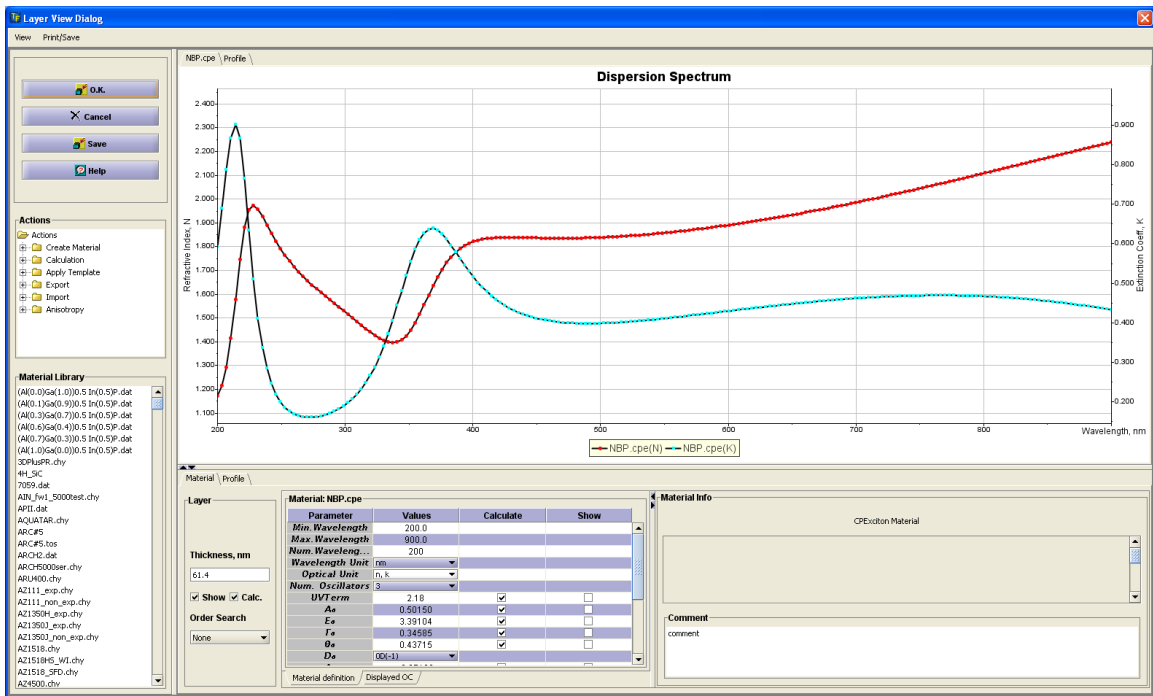


Fig. 11 Optical constants of the NPD material determined from the measurement.