SEMILAB

SEA regression report summary

Sample ID
001f-int-i 70° 1

Details	
Software and regression log	
Software about	Semilab - Spectroscopic Ellipsometry Analyzer - SEA
Software version	1.7.1
Officially licensed to	MIT
Operator	operator
Date and time of regression	14-07-2021 14:09
Comments	

Layer structure	
Overview	

Optical model	
Phase 2	ITO + void
Diffusion	
Phase 1	ITO
Dispersion law	Tauc-Lorentz
	Drude
	Lorentz

Regression results

Measurement information				
Measurement file path	C:\Users\emmabat\ito-si\001f-int-i.smdx			
Angle of Incidence	70°			
Regression details				
Regression 1 (EllipsoReflectance)				
Wavelength range	239.84 - 1698.83 nm			
Angle of Incidence	70°			
Fit to	<n>, <k>			
Angular Aperture	0°			
Fit algorithm	LMA			
Results				
Parameters	Value	Fitted	2 σ confidence limit	Unit
Model				
AOI Shift	0			°
Angular Aperture	0			°
Phase 2 (ITO + void)				
Thickness	48.433	X	0.29338	nm
Depolarization coefficient	0.33333			
Concentration 1	0.5			
Concentration 2	0.5			
Phase 1 (ITO)				
Thickness	146.951	X	0.79789	nm
A (eV)	499.9547			eV
E0 (eV)	6.0053			eV
C (eV)	61.46965	X	4.34175	eV
Eg (eV)	3.52296	X	0.19442	eV
E_p (eV)	1.04931	X	0.0077228	eV
E_Γ (eV)	0.4947	X	0.013188	eV
f	1.04486	X	0.033353	
E0 (eV)	4.08149	X	0.025332	eV
Γ (eV)	1.23919	X	0.027721	eV
Eps_inf	0			
Derived parameters	Value			
Phase 2 (ITO + void)				
n @ 632.8 nm	1.4137			
k @ 632.8 nm	0.0389			
Phase 1 (ITO)				
n @ 632.8 nm	1.8695			
k @ 632.8 nm	0.0846			
Substrate (si)				
n @ 632.8 nm	3.8811			
k @ 632.8 nm	0.0195			
Drude derived parameters	Value			Unit
Phase 1 (ITO)				
Conductivity (S/m)	2.994E+04 ± 1238.8915			S/m

|		
Resistivity (mΩ.cm)	3.34 ± 0.1382	mΩ.cm
Resistance (Ω/sq)	227.2888 ± 10.6391	Ω/sq
N type dopant concentration (at/cm3)	1.9963E+20 ± 2.9386E+18	at/cm3
P type dopant concentration (at/cm3)	2.9546E+20 ± 4.3491E+18	at/cm3
N type dopant mobility (cm2/Vs)	9.3607 ± 0.4111	cm2/Vs
P type dopant mobility (cm2/Vs)	6.3248 ± 0.2778	cm2/Vs
Fit quality		
R^2	0.99581	
RMSE	0.04317	

![SEMILAB]

Regression graphs
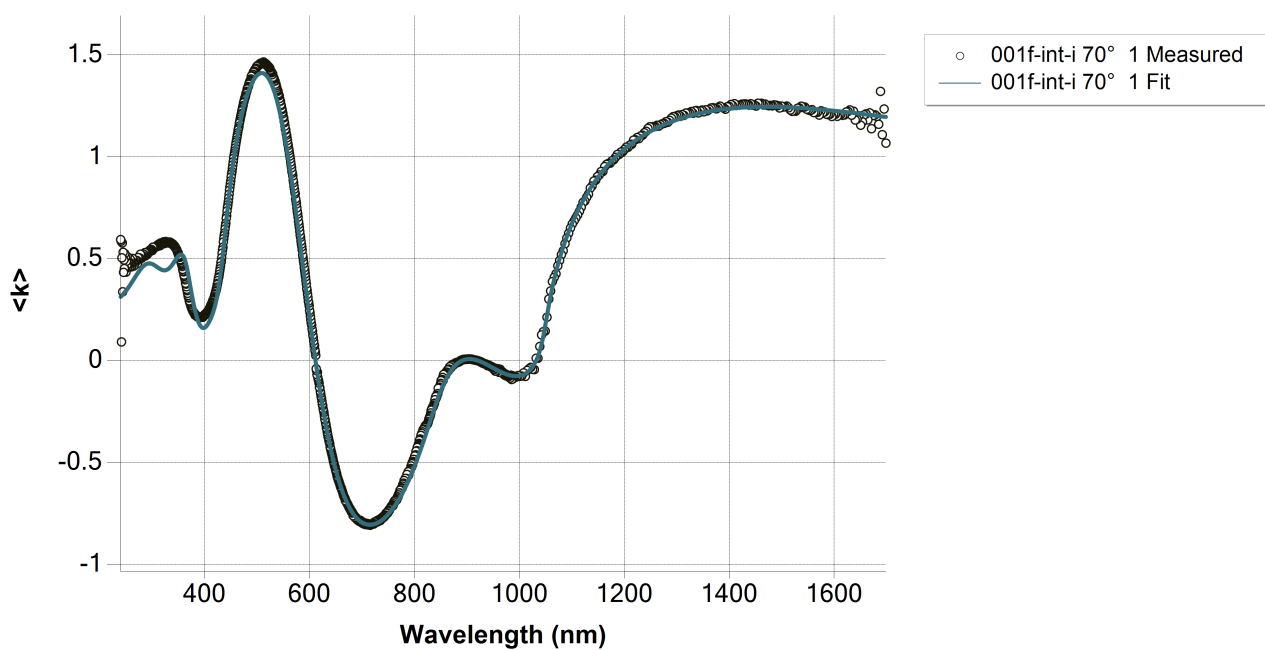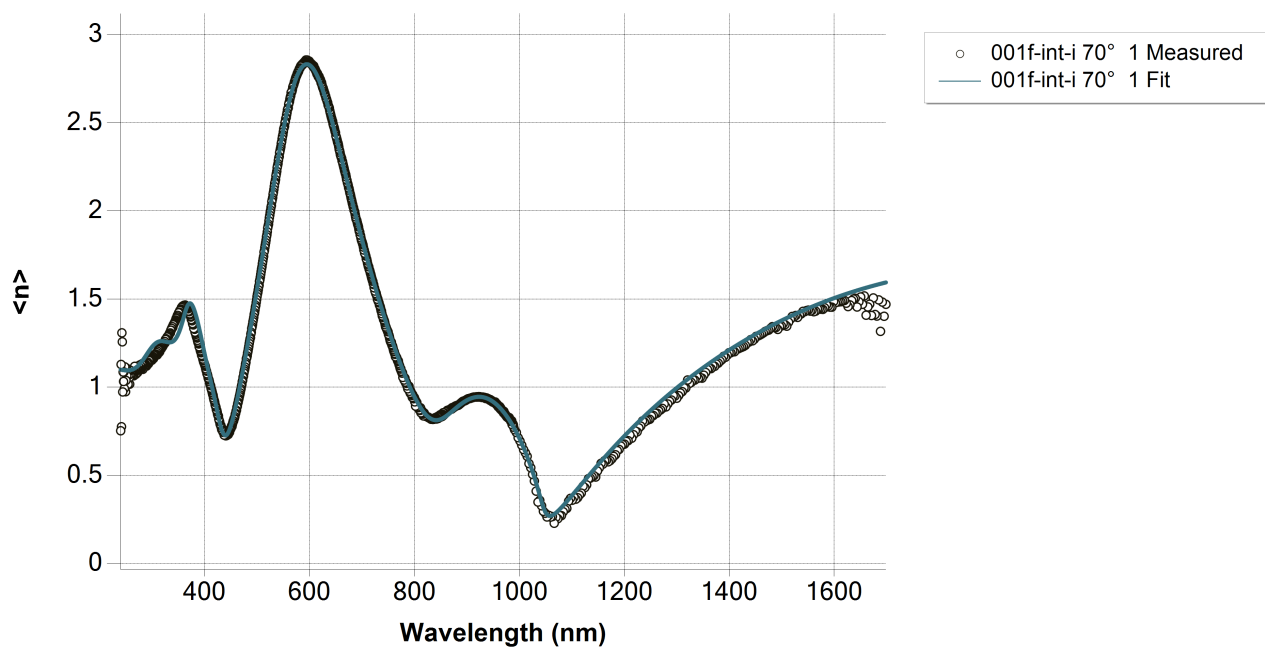
Phase 2 (ITO + void) - Dispersion graphs
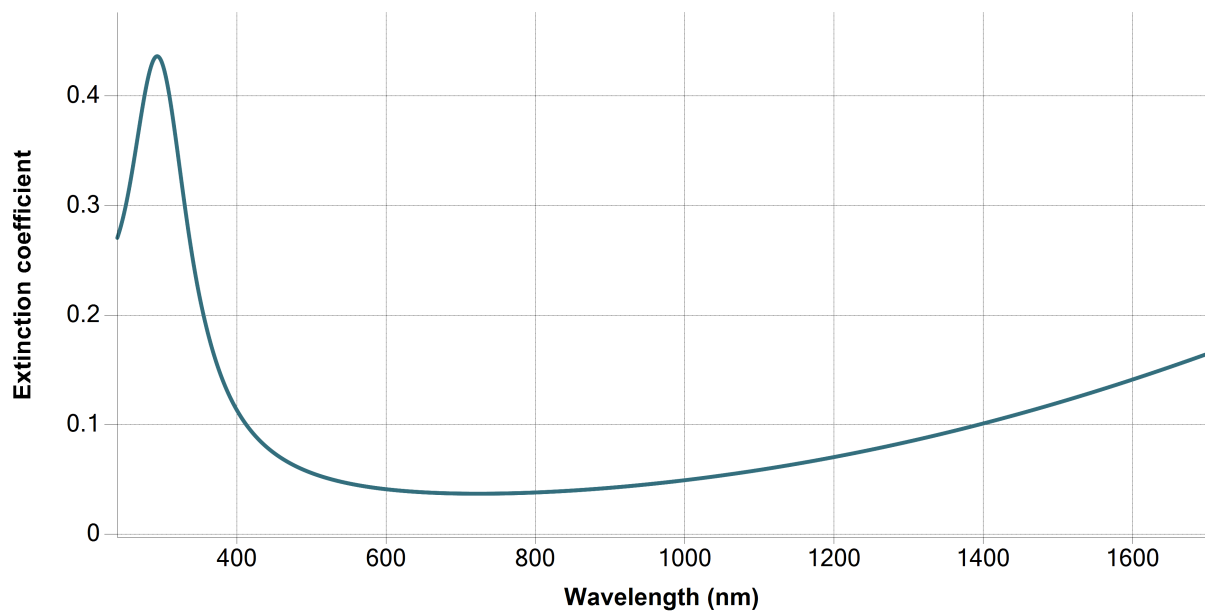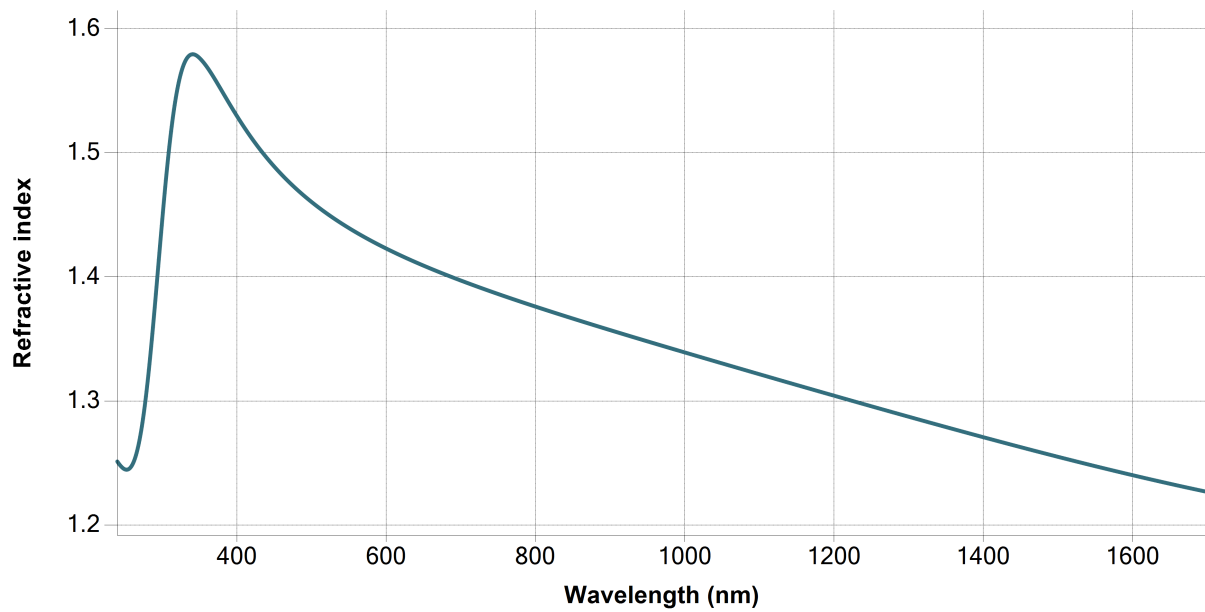
Phase 1 (ITO) - Dispersion graphs
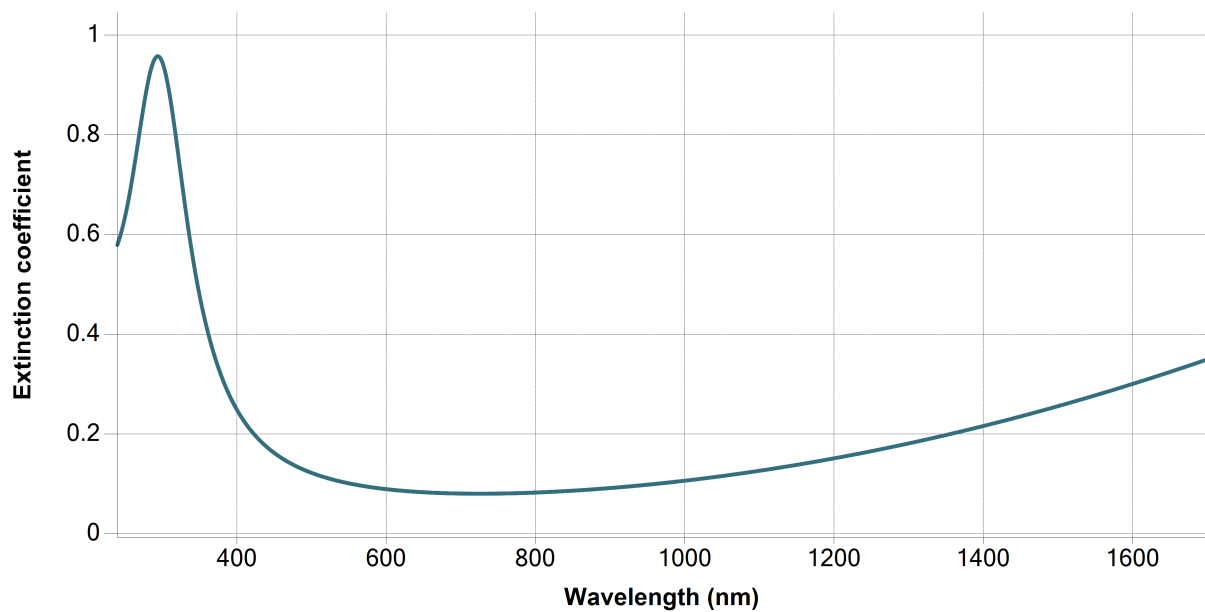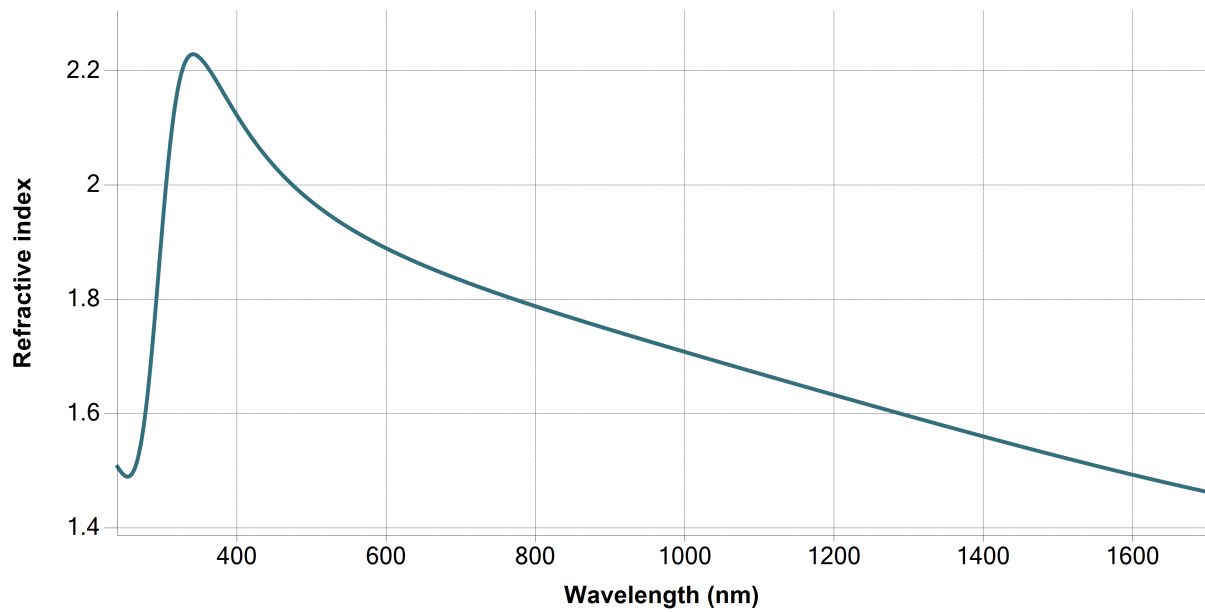
Substrate (si) - Dispersion graphs

Correlation coefficients	
Ph2 - ITO + void - Thickness --- Ph1 - ITO - Thickness	-0.507
Ph2 - ITO + void - Thickness --- Ph1 - Tauc-Lorentz[1] - C (eV)	0.0157
Ph2 - ITO + void - Thickness --- Ph1 - Tauc-Lorentz[1] - Eg (eV)	-0.0056
Ph2 - ITO + void - Thickness --- Ph1 - Drude[2] - E_p (eV)	-0.386
Ph2 - ITO + void - Thickness --- Ph1 - Drude[2] - E_Γ (eV)	-0.097
Ph2 - ITO + void - Thickness --- Ph1 - Lorentz[3] - f	0.1035
Ph2 - ITO + void - Thickness --- Ph1 - Lorentz[3] - E0 (eV)	-0.1344
Ph1 - ITO - Thickness --- Ph1 - Tauc-Lorentz[1] - C (eV)	-0.2408
Ph1 - ITO - Thickness --- Ph1 - Tauc-Lorentz[1] - Eg (eV)	0.2732
Ph1 - ITO - Thickness --- Ph1 - Drude[2] - E_p (eV)	0.5616
Ph1 - ITO - Thickness --- Ph1 - Drude[2] - E_Γ (eV)	0.5503
Ph1 - ITO - Thickness --- Ph1 - Lorentz[3] - f	-0.0064
Ph1 - ITO - Thickness --- Ph1 - Lorentz[3] - E0 (eV)	0.403
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Tauc-Lorentz[1] - Eg (eV)	-0.9873
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Drude[2] - E_p (eV)	-0.4765
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Drude[2] - E_Γ (eV)	0.0642
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Lorentz[3] - f	-0.7505
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Lorentz[3] - E0 (eV)	-0.5943
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Drude[2] - E_p (eV)	0.4237
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Drude[2] - E_Γ (eV)	-0.0441
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Lorentz[3] - f	0.8275
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Lorentz[3] - E0 (eV)	0.6776
Ph1 - Drude[2] - E_p (eV) --- Ph1 - Drude[2] - E_Γ (eV)	0.2157
Ph1 - Drude[2] - E_p (eV) --- Ph1 - Lorentz[3] - f	0.0886
Ph1 - Drude[2] - E_p (eV) --- Ph1 - Lorentz[3] - E0 (eV)	0.3347
Ph1 - Drude[2] - E_Γ (eV) --- Ph1 - Lorentz[3] - f	-0.2509
Ph1 - Drude[2] - E_Γ (eV) --- Ph1 - Lorentz[3] - E0 (eV)	-0.0525
Ph1 - Lorentz[3] - f --- Ph1 - Lorentz[3] - E0 (eV)	0.7841