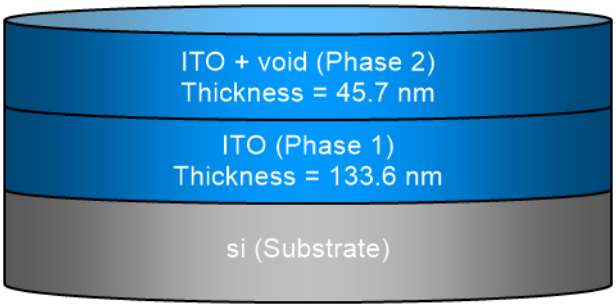
SEA regression report summary

Sample ID
001b-int-ii 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 14:08
Comments	

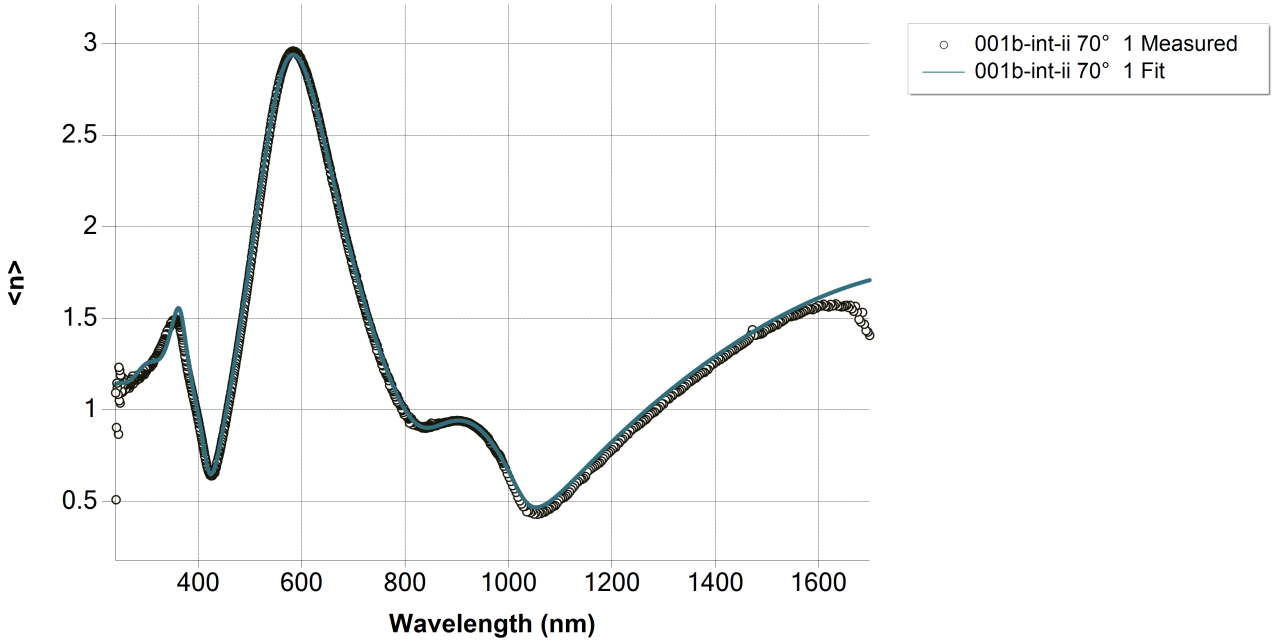
Layer structure	
Overview	
	
Optical model	
Phase 2	ITO + void
Diffusion	
Phase 1	ITO
Dispersion law	Tauc-Lorentz
	Drude
	Lorentz

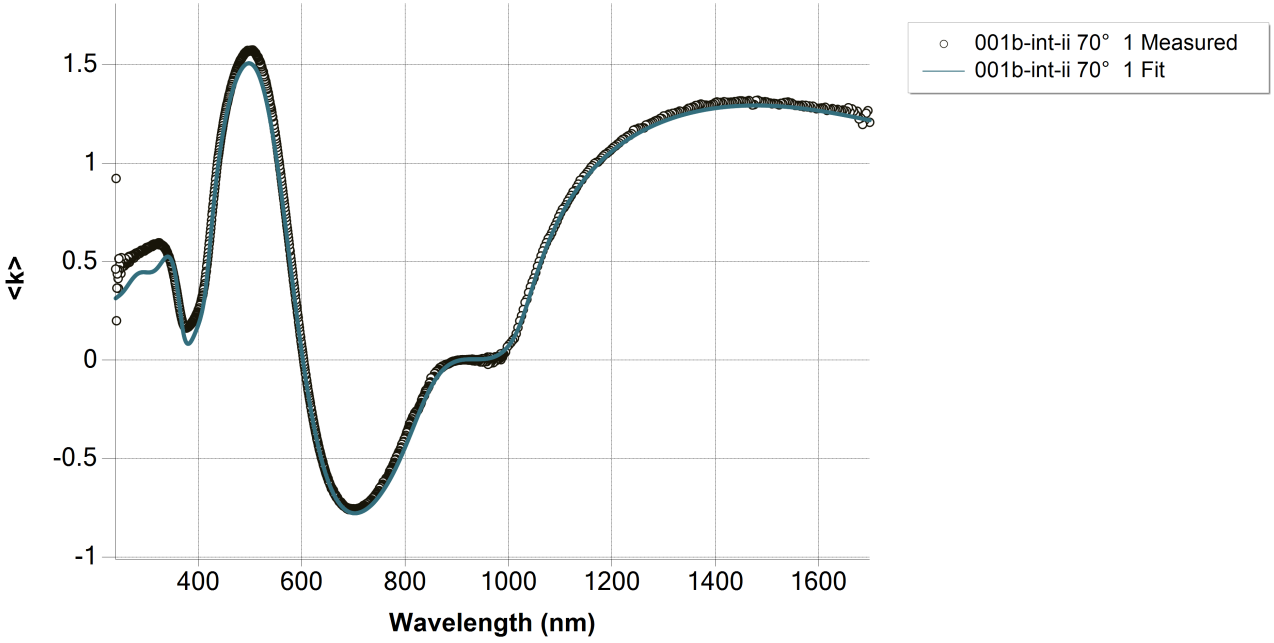
Regression results

Measurement information				
Measurement file path	C:\Users\emmabat\ito-si\001b-int-ii.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	45.741	X	0.27145	nm
Depolarization coefficient	0.33333			
Concentration 1	0.5			
Concentration 2	0.5			
Phase 1 (ITO)				
Thickness	133.621	X	0.69986	nm
A (eV)	499.9547			eV
E0 (eV)	6.0053			eV
C (eV)	37.62604	X	4.42573	eV
Eg (eV)	4.05995	X	0.25718	eV
E_p (eV)	1.10926	X	0.0088237	eV
E_Γ (eV)	0.36422	X	0.013629	eV
f	1.00618	X	0.034755	
E0 (eV)	4.21401	X	0.031682	eV
Γ (eV)	1.30361	X	0.029079	eV
Eps_inf	0			
Derived parameters	Value			
Phase 2 (ITO + void)				
n @ 632.8 nm	1.4568			
k @ 632.8 nm	0.0333			
Phase 1 (ITO)				
n @ 632.8 nm	1.9635			
k @ 632.8 nm	0.0727			
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)	4.5444E+04 ± 2423.4154			S/m

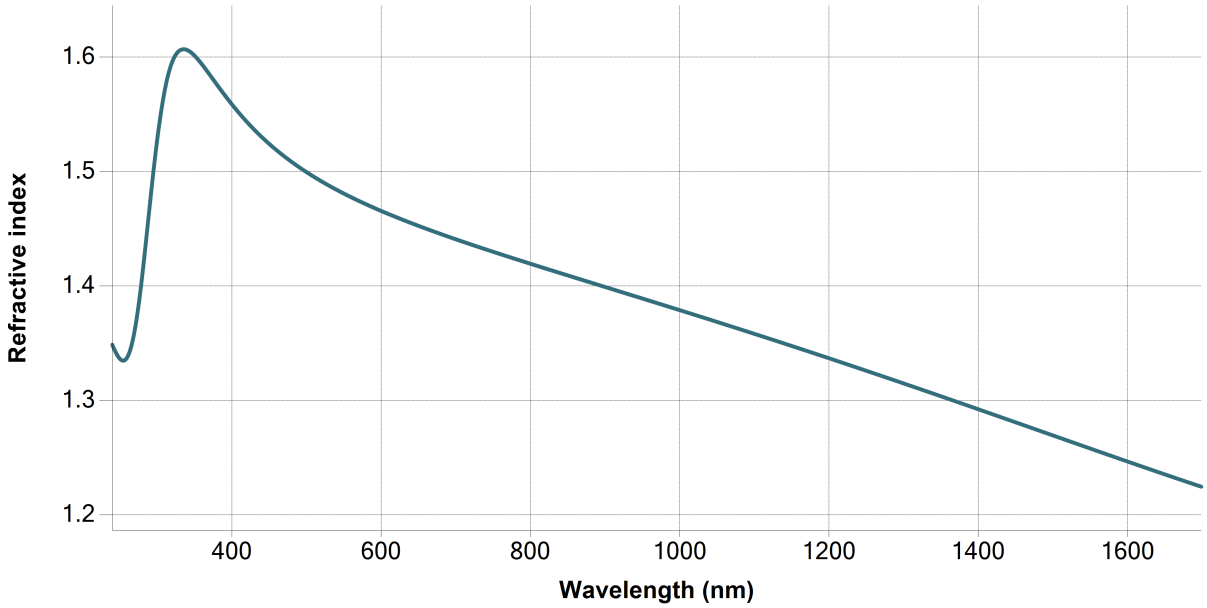
Resistivity (mΩ.cm)	2.2005 ± 0.1173	mΩ.cm
Resistance (Ω/sq)	164.6821 ± 9.6446	Ω/sq
N type dopant concentration (at/cm3)	2.2309E+20 ± 3.5492E+18	at/cm3
P type dopant concentration (at/cm3)	3.3018E+20 ± 5.2529E+18	at/cm3
N type dopant mobility (cm2/Vs)	12.7139 ± 0.7075	cm2/Vs
P type dopant mobility (cm2/Vs)	8.5905 ± 0.4781	cm2/Vs
Fit quality		
R^2	0.99486	
RMSE	0.04956	

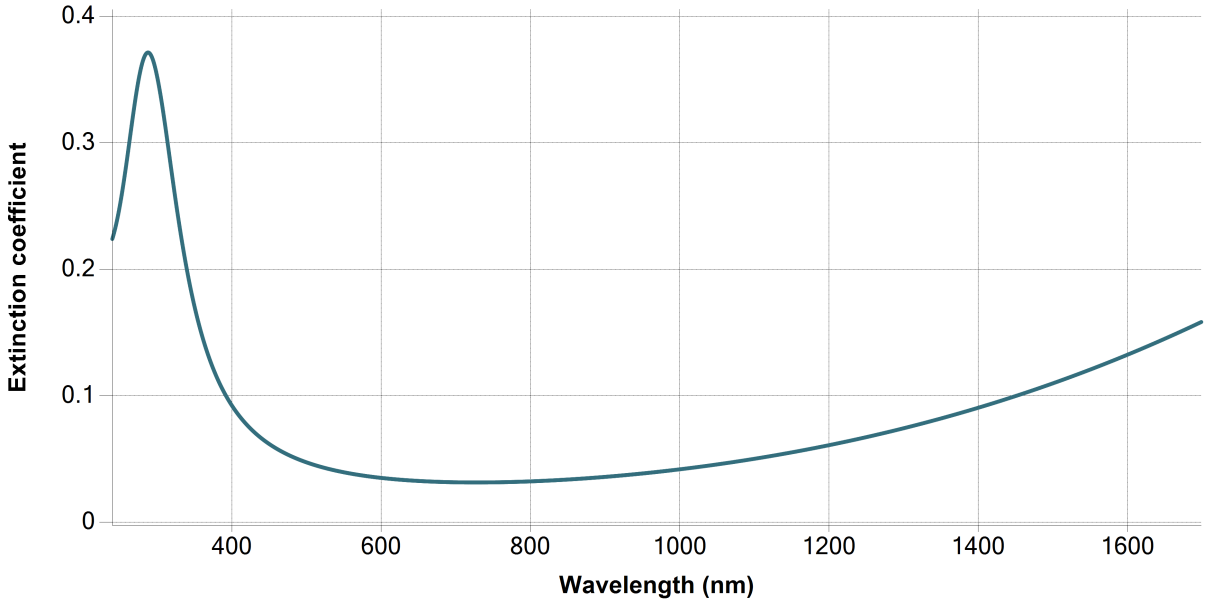
Regression graphs



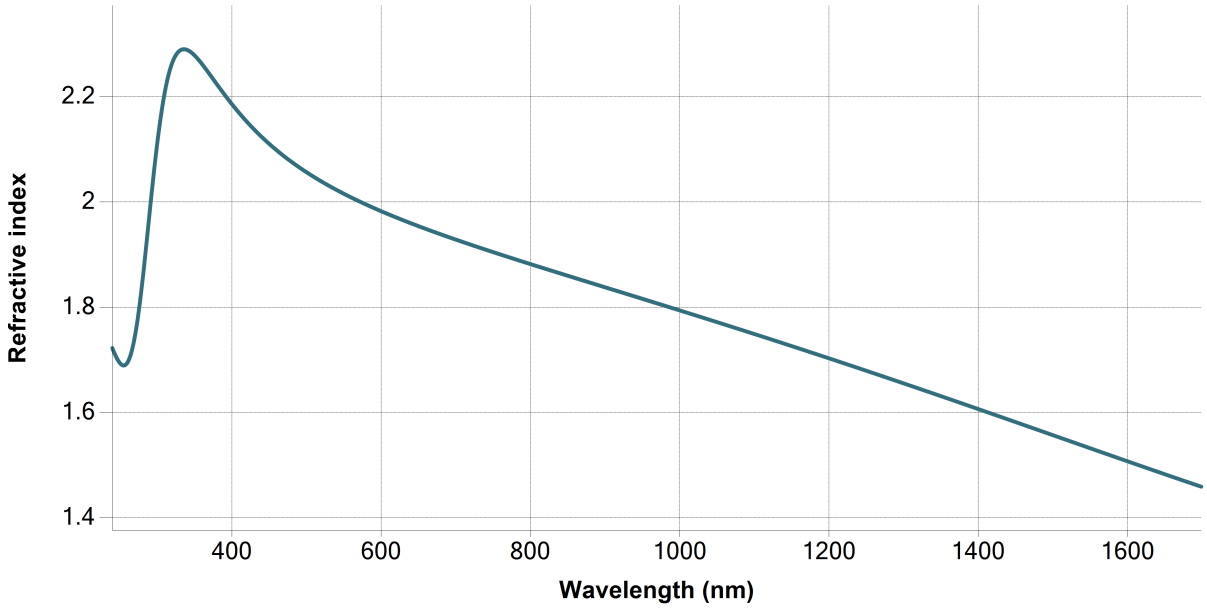


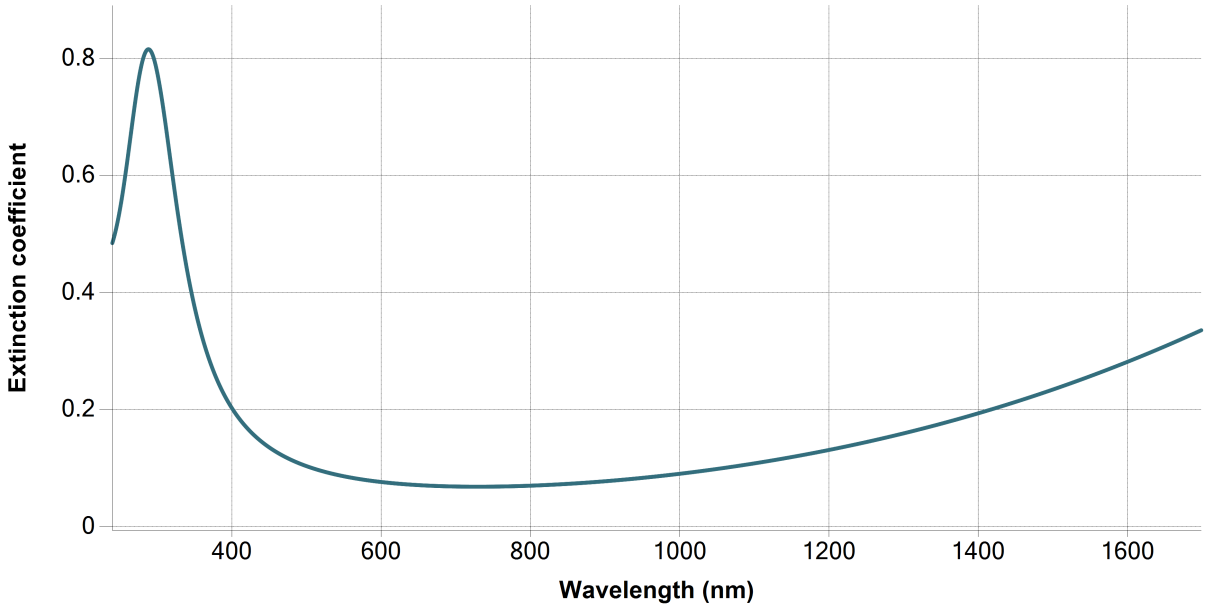
Phase 2 (ITO + void) - Dispersion graphs



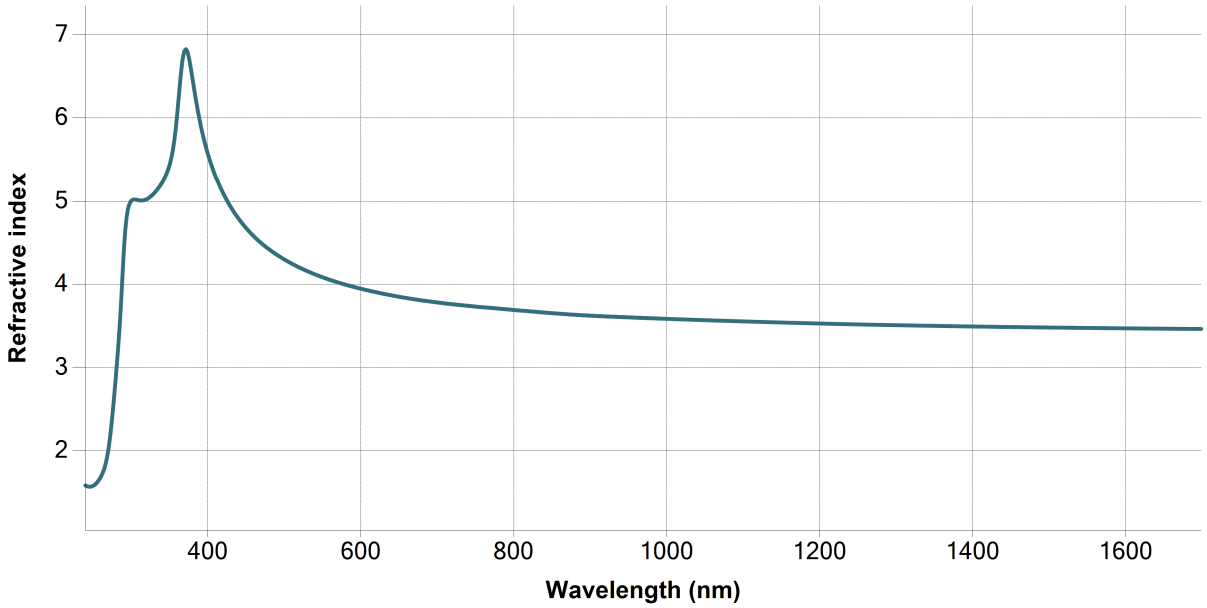


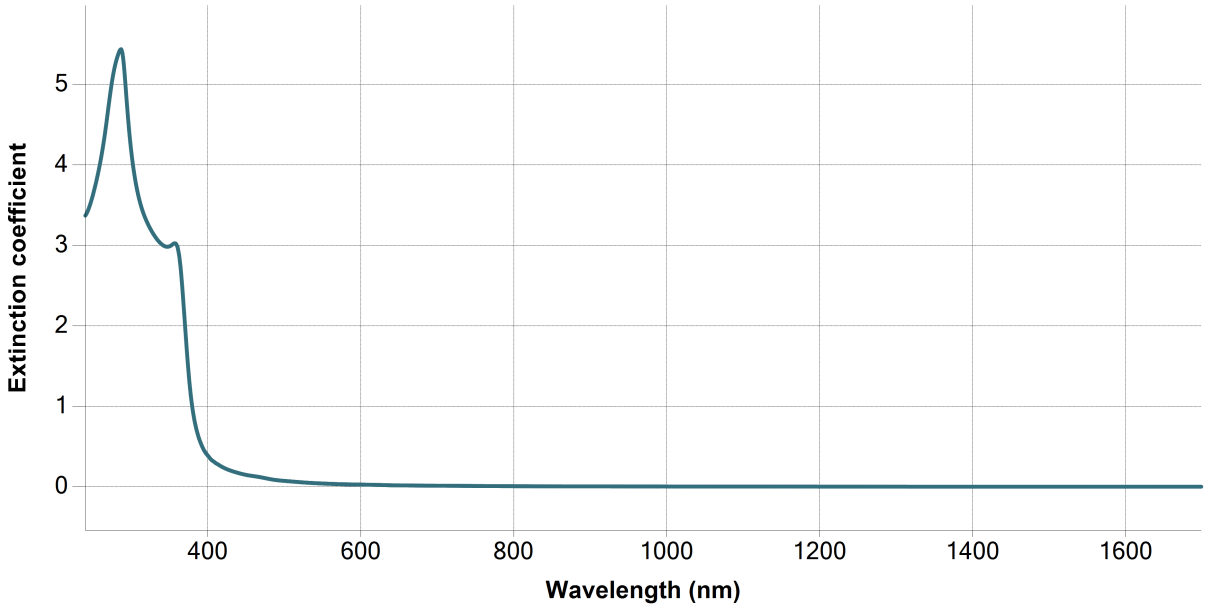
Phase 1 (ITO) - Dispersion graphs





Substrate (si) - Dispersion graphs





Correlation coefficients	
Ph2 - ITO + void - Thickness --- Ph1 - ITO - Thickness	-0.436
Ph2 - ITO + void - Thickness --- Ph1 - Tauc-Lorentz[1] - C (eV)	-0.0488
Ph2 - ITO + void - Thickness --- Ph1 - Tauc-Lorentz[1] - Eg (eV)	0.0602
Ph2 - ITO + void - Thickness --- Ph1 - Drude[2] - E_p (eV)	-0.33
Ph2 - ITO + void - Thickness --- Ph1 - Drude[2] - E_Γ (eV)	-0.1254
Ph2 - ITO + void - Thickness --- Ph1 - Lorentz[3] - f	0.1487
Ph2 - ITO + void - Thickness --- Ph1 - Lorentz[3] - E0 (eV)	-0.0347
Ph1 - ITO - Thickness --- Ph1 - Tauc-Lorentz[1] - C (eV)	-0.1958
Ph1 - ITO - Thickness --- Ph1 - Tauc-Lorentz[1] - Eg (eV)	0.2277
Ph1 - ITO - Thickness --- Ph1 - Drude[2] - E_p (eV)	0.3702
Ph1 - ITO - Thickness --- Ph1 - Drude[2] - E_Γ (eV)	0.5683
Ph1 - ITO - Thickness --- Ph1 - Lorentz[3] - f	-0.0415
Ph1 - ITO - Thickness --- Ph1 - Lorentz[3] - E0 (eV)	0.3162
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Tauc-Lorentz[1] - Eg (eV)	-0.9918
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Drude[2] - E_p (eV)	-0.4068
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Drude[2] - E_Γ (eV)	0.0302
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Lorentz[3] - f	-0.6501
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Lorentz[3] - E0 (eV)	-0.5172
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Drude[2] - E_p (eV)	0.3543
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Drude[2] - E_Γ (eV)	-0.0228
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Lorentz[3] - f	0.7259
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Lorentz[3] - E0 (eV)	0.5979
Ph1 - Drude[2] - E_p (eV) --- Ph1 - Drude[2] - E_Γ (eV)	0.1663
Ph1 - Drude[2] - E_p (eV) --- Ph1 - Lorentz[3] - f	-0.0255
Ph1 - Drude[2] - E_p (eV) --- Ph1 - Lorentz[3] - E0 (eV)	0.1526
Ph1 - Drude[2] - E_Γ (eV) --- Ph1 - Lorentz[3] - f	-0.2702
Ph1 - Drude[2] - E_Γ (eV) --- Ph1 - Lorentz[3] - E0 (eV)	-0.0809
Ph1 - Lorentz[3] - f --- Ph1 - Lorentz[3] - E0 (eV)	0.8308