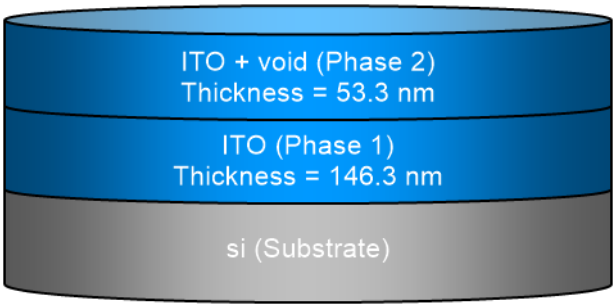
SEA regression report summary

Sample ID
001c-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 14:11
Comments	

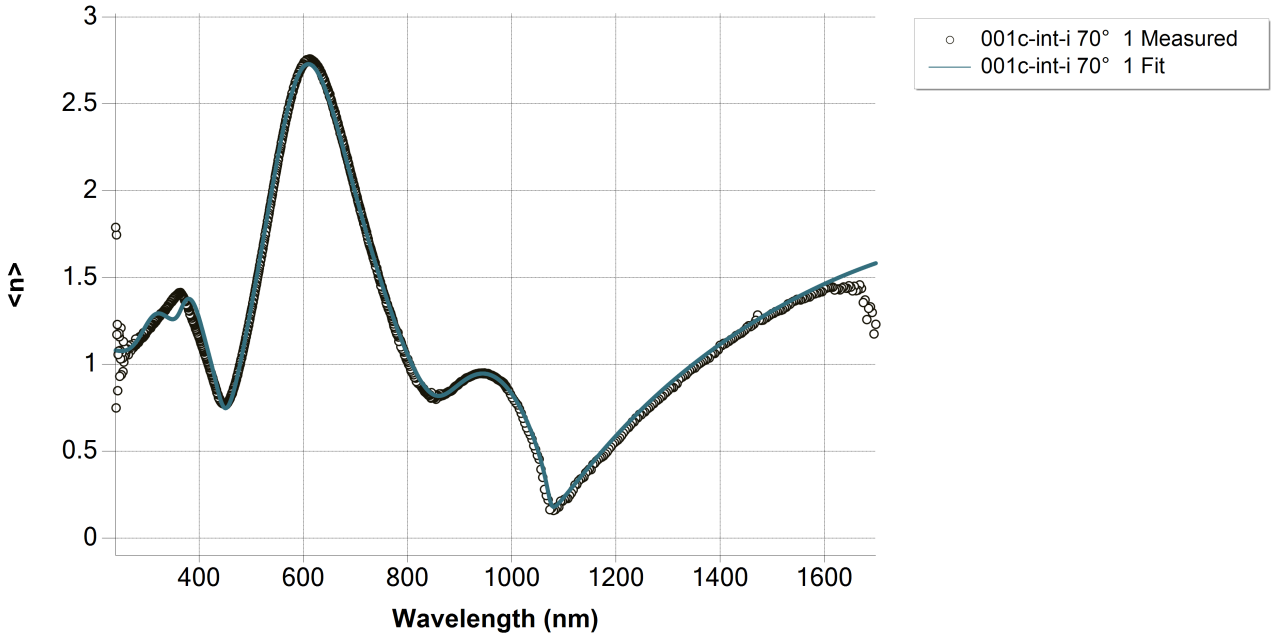
Layer structure	
Overview	
	
Optical model	
Phase 2	ITO + void
Diffusion	
Phase 1	ITO
Dispersion law	Tauc-Lorentz
	Drude
	Lorentz

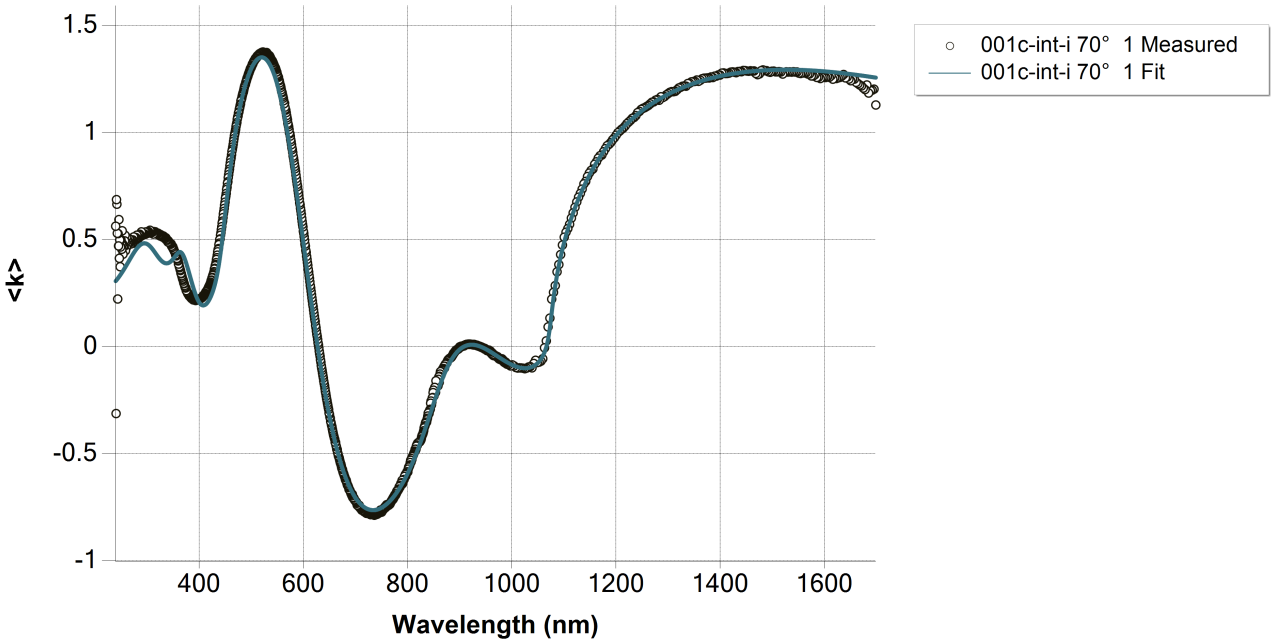
Regression results

Measurement information				
Measurement file path	C:\Users\emmabat\ito-si\001c-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	53.333	X	0.3479	nm
Depolarization coefficient	0.33333			
Concentration 1	0.5			
Concentration 2	0.5			
Phase 1 (ITO)				
Thickness	146.324	X	0.91643	nm
A (eV)	499.9547			eV
E0 (eV)	6.0053			eV
C (eV)	72.66552	X	5.14803	eV
Eg (eV)	3.33662	X	0.20126	eV
E_p (eV)	0.96306	X	0.008833	eV
E_Γ (eV)	0.41153	X	0.015599	eV
f	1.19313	X	0.035625	
E0 (eV)	4.00381	X	0.025393	eV
Γ (eV)	1.252	X	0.029809	eV
Eps_inf	0			
Derived parameters	Value			
Phase 2 (ITO + void)				
n @ 632.8 nm	1.4228			
k @ 632.8 nm	0.0428			
Phase 1 (ITO)				
n @ 632.8 nm	1.8893			
k @ 632.8 nm	0.0932			
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)	3.0317E+04 ± 1705.2834			S/m

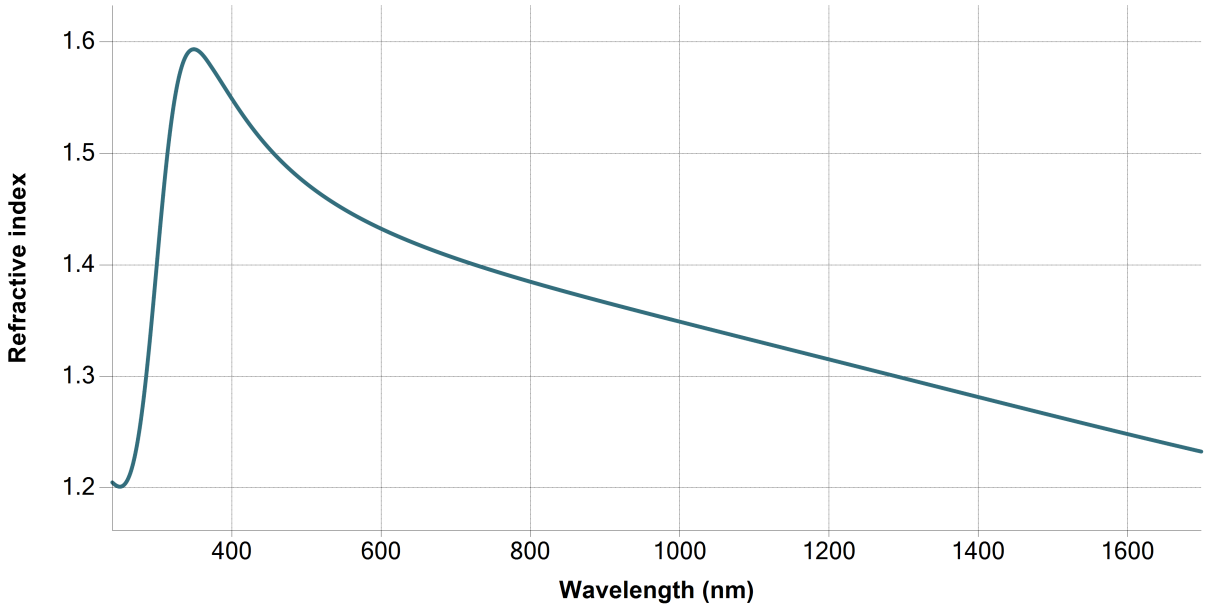
Resistivity (mΩ.cm)	3.2985 ± 0.1855	mΩ.cm
Resistance (Ω/sq)	225.426 ± 14.0919	Ω/sq
N type dopant concentration (at/cm3)	1.6816E+20 ± 3.0847E+18	at/cm3
P type dopant concentration (at/cm3)	2.4888E+20 ± 4.5654E+18	at/cm3
N type dopant mobility (cm2/Vs)	11.2523 ± 0.6657	cm2/Vs
P type dopant mobility (cm2/Vs)	7.6029 ± 0.4498	cm2/Vs
Fit quality		
R^2	0.99405	
RMSE	0.04974	

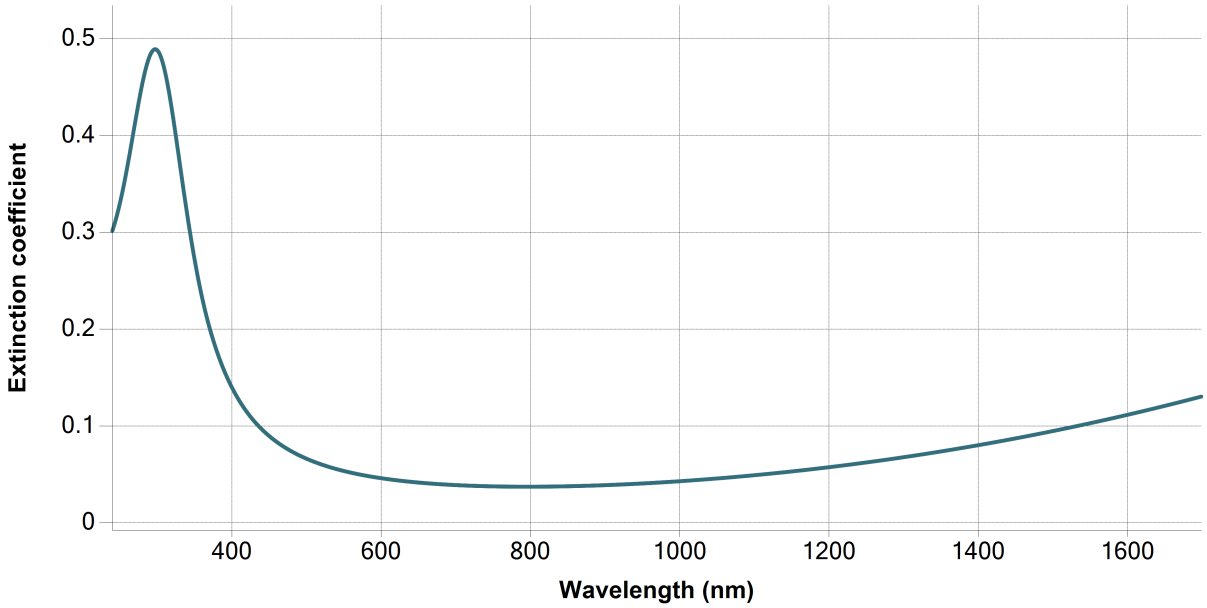
Regression graphs



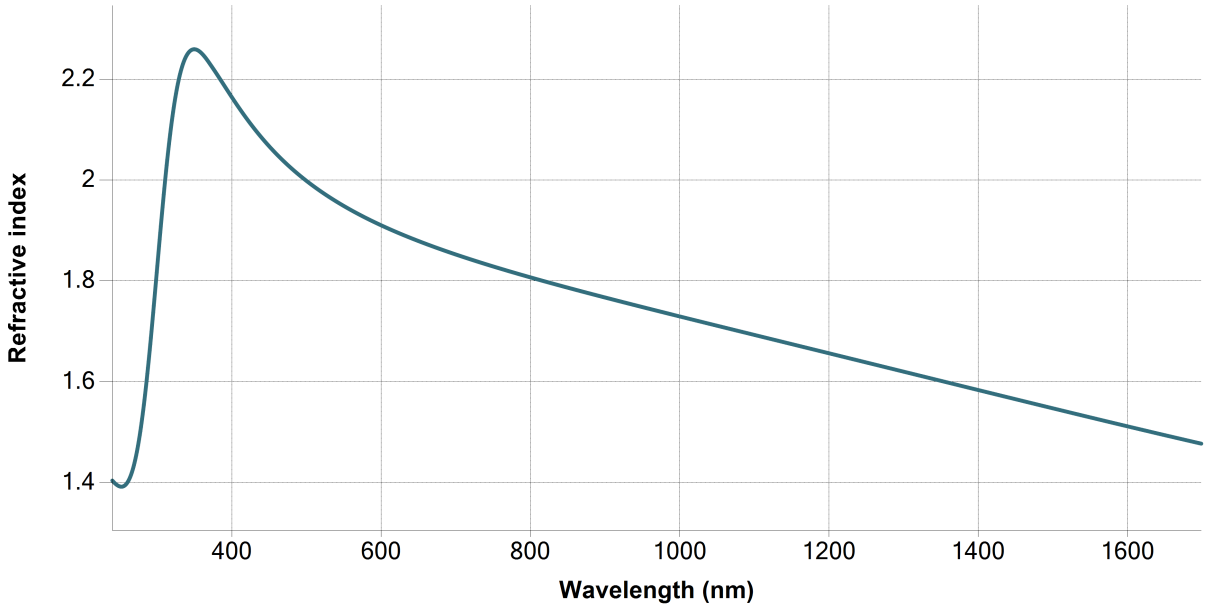


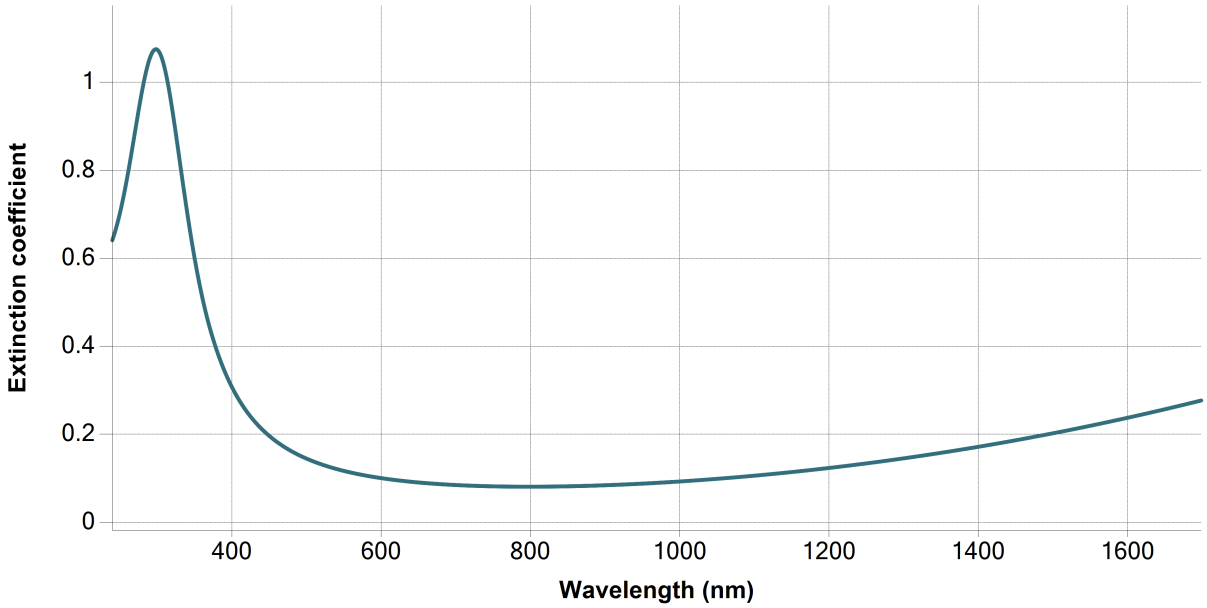
Phase 2 (ITO + void) - Dispersion graphs



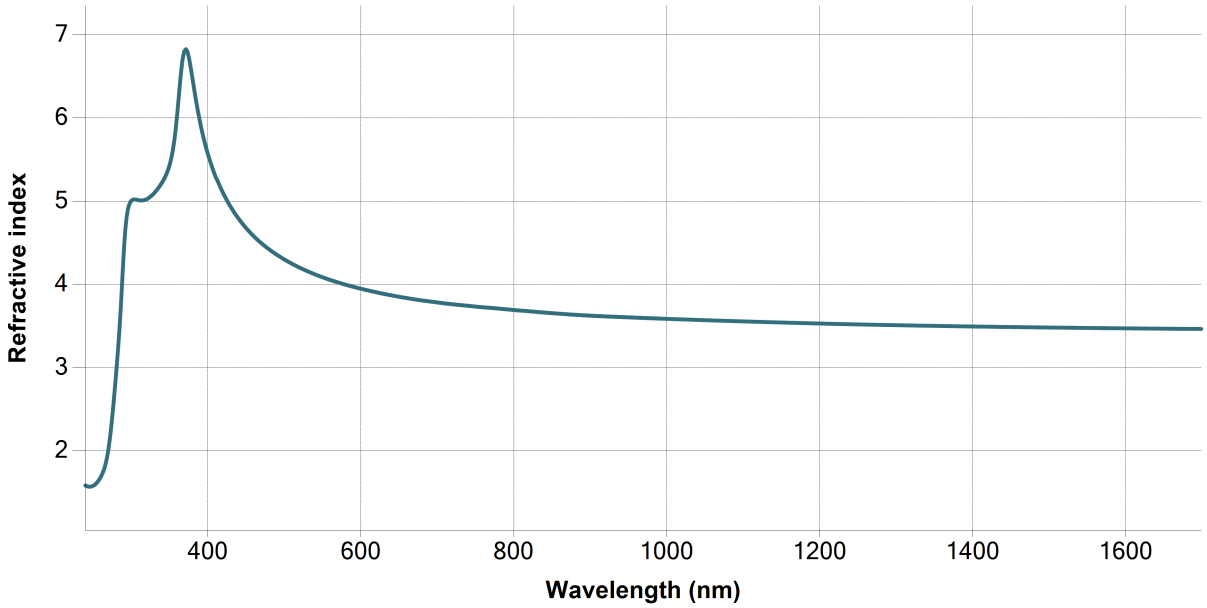


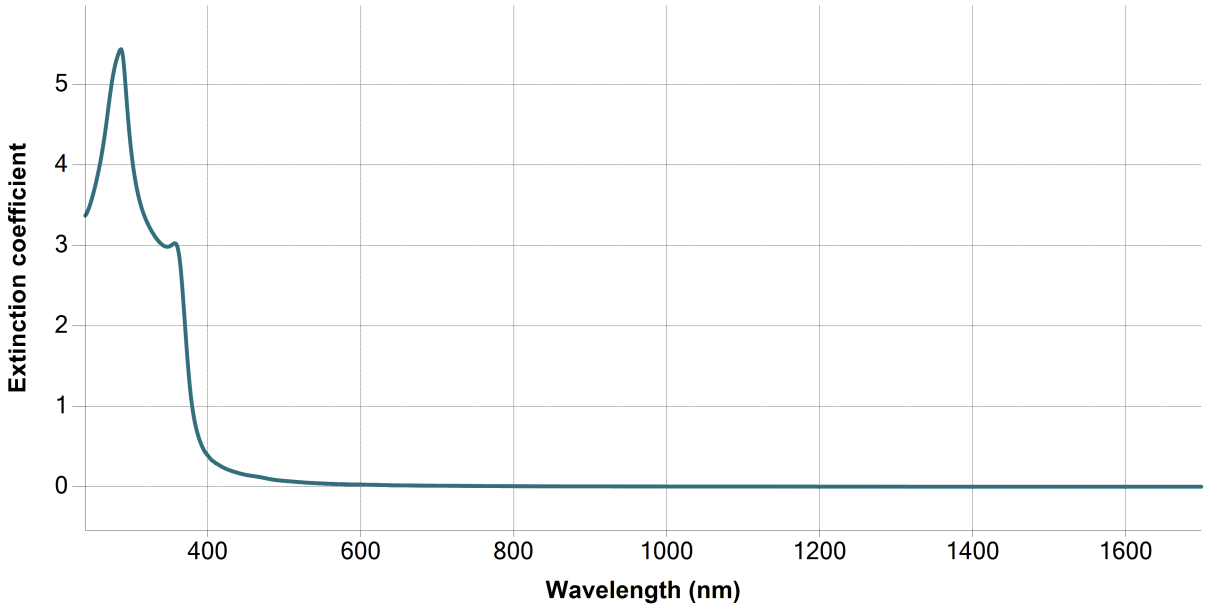
Phase 1 (ITO) - Dispersion graphs





Substrate (si) - Dispersion graphs





Correlation coefficients	
Ph2 - ITO + void - Thickness --- Ph1 - ITO - Thickness	-0.4587
Ph2 - ITO + void - Thickness --- Ph1 - Tauc-Lorentz[1] - C (eV)	-0.0673
Ph2 - ITO + void - Thickness --- Ph1 - Tauc-Lorentz[1] - Eg (eV)	0.0572
Ph2 - ITO + void - Thickness --- Ph1 - Drude[2] - E_p (eV)	-0.3363
Ph2 - ITO + void - Thickness --- Ph1 - Drude[2] - E_Γ (eV)	-0.0754
Ph2 - ITO + void - Thickness --- Ph1 - Lorentz[3] - f	0.0666
Ph2 - ITO + void - Thickness --- Ph1 - Lorentz[3] - E0 (eV)	-0.203
Ph1 - ITO - Thickness --- Ph1 - Tauc-Lorentz[1] - C (eV)	-0.1757
Ph1 - ITO - Thickness --- Ph1 - Tauc-Lorentz[1] - Eg (eV)	0.2384
Ph1 - ITO - Thickness --- Ph1 - Drude[2] - E_p (eV)	0.5513
Ph1 - ITO - Thickness --- Ph1 - Drude[2] - E_Γ (eV)	0.6212
Ph1 - ITO - Thickness --- Ph1 - Lorentz[3] - f	0.0279
Ph1 - ITO - Thickness --- Ph1 - Lorentz[3] - E0 (eV)	0.5041
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Tauc-Lorentz[1] - Eg (eV)	-0.983
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Drude[2] - E_p (eV)	-0.4747
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Drude[2] - E_Γ (eV)	0.0301
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Lorentz[3] - f	-0.7531
Ph1 - Tauc-Lorentz[1] - C (eV) --- Ph1 - Lorentz[3] - E0 (eV)	-0.5218
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Drude[2] - E_p (eV)	0.4341
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Drude[2] - E_Γ (eV)	0.0138
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Lorentz[3] - f	0.8381
Ph1 - Tauc-Lorentz[1] - Eg (eV) --- Ph1 - Lorentz[3] - E0 (eV)	0.6139
Ph1 - Drude[2] - E_p (eV) --- Ph1 - Drude[2] - E_Γ (eV)	0.237
Ph1 - Drude[2] - E_p (eV) --- Ph1 - Lorentz[3] - f	0.1603
Ph1 - Drude[2] - E_p (eV) --- Ph1 - Lorentz[3] - E0 (eV)	0.4525
Ph1 - Drude[2] - E_Γ (eV) --- Ph1 - Lorentz[3] - f	-0.176
Ph1 - Drude[2] - E_Γ (eV) --- Ph1 - Lorentz[3] - E0 (eV)	0.091
Ph1 - Lorentz[3] - f --- Ph1 - Lorentz[3] - E0 (eV)	0.7012