

UseCase.0016 (1.1)

Materials Catalog

Keywords: material, dispersion, absorption, formula based, sampled, programmable

Description

- This use case demonstrates how the material catalog can be used within VirtualLab.
- An overview of the possibilities to access material information will be given.
- It is shown how materials can be loaded from catalog and saved for further using.
- The material catalog can be accessed via the corresponding ribbon item in the catalog ribbon:



Material Catalog



- The material catalog contains materials of standard material catalogs of glasses, metals and thin films, partly named according to a vendor.
- The catalog is organized in categories.
- VirtualLab allows the definition of multiple categories for each material.
- Some often used materials (e.g. Air, Fused Silica, Water), that are not assigned to specific categories are collected in "Miscellaneous".
- Infrared and X-ray materials are categorized as well.

Material Preview – Diagram



- The preview of a material can be used to visualize the dispersion and absorption properties of the selected material.
- The minimum and maximum wavelength are listed at the bottom of the preview.
- The diagram page shows the wavelength dependency or energy dependency.
- This diagram can be configured for adapting the visualization of the properties.

Material Preview – Diagram

Configure Material Diagram	×	
Show Energy Dependence Instead of Wavelength Dependence		
V Show Refractive Index	Show Absorption	
	Ocefficient α	
	Index κ	
Use Intersection of Valid Wavelength Ranges		
Refractive Index Diagram	Absorption Diagram	
Line Color	Line Color	
	Show Symbols for Data Points	
Axes are Colored Like Graphs Line Thickness		
	Ok Cancel Help	

- The diagram can be configured to show the real refractive index and/or absorption data depending on wavelength or energy.
- For absorption, the user can select whether alpha or kappa shall be viewed.
- In addition, the user can specify the coloring and thickness of the curves to display.

Material Preview – Additional Information

Preview for	BK7G18_Schott_2014 – 🗖	×
BK7G18_Schott_2014 (Categories: Schott_2014 / Radiation_Hat	rdened / Infrared)	
Diagram Additional Information		
State of Matter	Solid	^
Valid Vacuum Wavelength Ranges		
Definition Range for Refractive Index	380.11 nm 2.5007 µm	
Definition Range for Absorption	380 nm 2.5 μm	
Coefficients Calculator		
Test Wavelength	532 nm	
Refractive Index	n 1.5229	
Absorption Coefficient	α 1.2967 1/m	
Absorption Index	к 5.4896Е-08	
Relative Transmittance for a Thickness of	0 m 1	
		×
Valid Vacuum Wavelength Range		
Min. Wavelength 380.11 nm	Max. Wavelength 2.5	μm
	Close	

- In the tab Additional Information the user can access supplementary information on the selected material.
- Here the state of matter is shown.
- Also the valid wavelength ranges for refractive index and absorption are listed. (separately at the top, and combined at the bottom)

Material Preview – Additional Information

Preview for	BK7G18_Schott_2014 – 🗖	×
BK7G18_Schott_2014 (Categories: Schott_2014 / Radiation_Har	rdened / Infrared)	
Diagram Additional Information		
State of Matter	Solid	^
Valid Vacuum Wavelength Ranges		
Definition Range for Refractive Index	380.11 nm 2.5007 µm	
Definition Range for Absorption	380 nm 2.5 μm	
Coefficients Calculator		
Test Wavelength	532 nm	
Refractive Index	n 1.5229	
Absorption Coefficient	α 1.2967 1/m	
Absorption Index	к 5.4896Е-08	
Relative Transmittance for a Thickness of	0 m 1	
Valid Vacuum Wavelength Range		
Min. Wavelength 380.11 nm	Max. Wavelength 2	2.5 µm
	Clos	e

- On this tab also a small calculator is available.
- It can be used to calculate the numerical values for refractive index and absorption for a user defined wavelength.
- It is also possible to calculate the transmittance for a given thickness of the material.

Store Materials Into Catalogs

	Edit Material Data	×
Material Name B	3K7G18_Schott_2014	
Refractive Index	Absorption Coefficient Additional Information	
Dispersion Ec	$(K_1 \cdot \lambda^2 - K_2 \cdot \lambda^2)$	
C Dispersion 1 C	$n = \left(\frac{1}{\lambda^2 - L_1} + \frac{1}{\lambda^2 - L_2}\right)$	
Sellmeier 1	V 11 / 12 77 32 0.5	
 Sampled Disp 	persion $+ \frac{K_3 \cdot \lambda^2}{1} + 1$	
 Constant 	$\lambda^2 - L_3$ λ^2	
Deta	· · · · · · · · · · · · · · · · · · ·	
Data		
Relative to Re	eference Material Air (ZEMAX) Set	
Parameters	Values for Wavelength in µm	1
K1	1.26538542	
L1	0.00813104078	
K2	0.0144191073	
L2	0.0543303226	
K3	1.00323028	
L3	102.821166	
Domain of Definiti	tion	
Domain or Dennin		
Wavelength Ran	nge (in Reference Material) 380 nm to 2.5 μm	
Usable Vacuum	Wavelength Range i 380.11 nm to 2.5 μm	
🔍 📄 Reset	t All Data Ok Cancel Help	

- By editing a material the user can specify the characteristics of the material.
- After this is done, the material can be saved as user-defined catalog entry by clicking on the save to catalog button.

Catalog Access to Material Catalog

Edit Homogeneous Medium
Basic Parameters Scaling Periodization
Material of Homogeneous Medium
Name Standard Air
Catalog Material 🗸 📝 📔
State of Matter Gas or Vacuum 🗸
OK Cancel Help

- Materials are typically used to define media.
- Within the edit dialog of a optical medium the user can select the base material.
- The material can be
 - Visualized
 - Edited
 - Loaded from Catalog



- Materials are a basic building block to set up optical systems.
- The catalog concept allows to use a large database of already defined materials as well as user-defined ones.
- The preview of the materials within the catalog gives a good insight of the selected materials and its properties.