

Product Information

Lanthanum Fluoride Patinal®

GENERAL INFORMATION

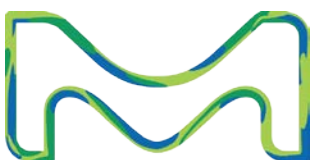
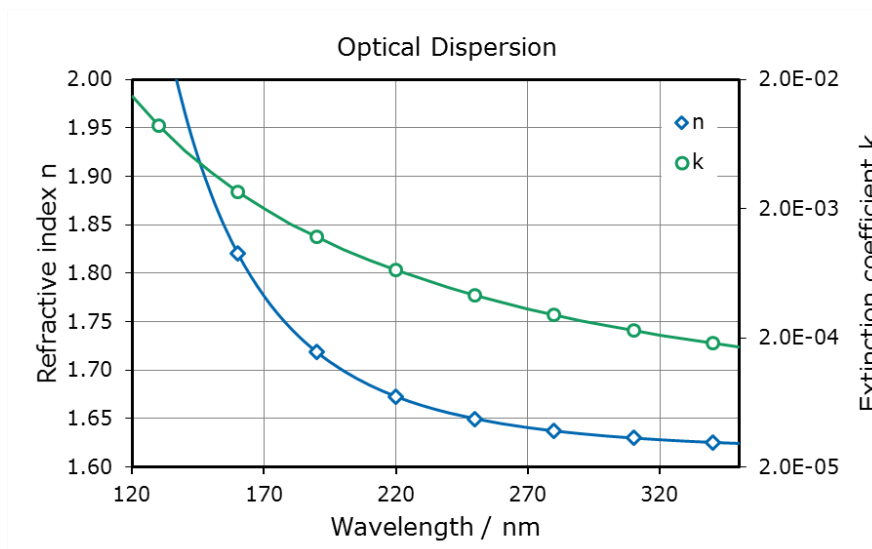
Lanthanum Fluoride Patinal® (LaF₃) is a versatile coating material for applications in the UV, VIS and IR spectral range. Its predominant application is in the UV wavelength range as a high index material for optical multilayer coatings, especially for semiconductor lithography optics.

AREAS OF APPLICATION

- AR and HR coatings for laser applications in the VUV spectral range, e.g. at excimer wavelengths 157nm and 193nm, often in combination with MgF₂
- Medium index material for coatings in the IR

THIN FILM PROPERTIES

Range of transparency	150 nm – 11 μm
Refractive index at 190 nm	1.72
Thin film stress	Tensile



The resulting optical properties of the thin film are dependent on process conditions such as deposition rate and substrate temperature.

wavl / nm	130	160	190	220	250	280	340
n	2.087	1.821	1.719	1.673	1.650	1.637	1.625
k	8.8E-03	2.7E-03	1.2E-03	6.7E-04	4.3E-04	3.0E-04	1.8E-04

NOTES FOR EVAPORATION

Evaporator source	Thermal evaporation from boat Electron beam gun
Boat / liner	Molybdenum or tantalum / copper
Evaporation temperature	1200 – 1600 °C
Deposition rate	about 0.6 nm/s
Substrate temperature	250 – 350 °C
OCR-settings	Density 5.94 g/cm ³ , z-ratio 1.0

LaF₃ can be deposited by e-beam and boat evaporation. LaF₃ tends to show higher absorption in the VUV when evaporated by e-beam, due to dissociation. A substrate temperature in the range of 250 to 350 °C is required for dense film structures. Evaporated thin films made from LaF₃ show columnar crystalline growth. LaF₃ grows in a hexagonal crystal structure. LaF₃ thin films deposited onto CaF₂ substrates show reduced inhomogeneity and higher density compared to thin films on fused silica substrates due to hetero-epitaxial growth.



PRODUCTS

Product Code	Description	Purity*	Dimensions
1.01129	Lanthanum Fluoride Granules Patinal®	≥ 99.95 % (3N5)	Granules, about 1 – 3 mm

* The purity values are based on the specified trace metals.

Appearance

1.01129	White granules
---------	----------------

SPECIFICATION

Cobalt (Co)	≤ 0.001 %
Copper (Cu)	≤ 0.001 %
Chromium (Cr)	≤ 0.001 %
Iron (Fe)	≤ 0.002 %
Lead (Pb)	≤ 0.005 %
Manganese (Mn)	≤ 0.001 %
Oxygen (O)	≤ 0.15 %

Sizes

1.01129	Granules 1 - 3 mm ≥ 80 %
---------	-----------------------------

Application test

Each batch has to pass a specific application test assessing its evaporation behaviour.

RoHS information

The RoHS compliance information is part of the Certificate of Analysis (CoA) for each batch of Patinal® material.



Quality assurance

Research, production and sales of our Patinal® evaporation materials take place under a certified DIN EN ISO 9001:2000 quality management system and DIN EN ISO 14001 environmental management system. The quality of the materials is assured by our manufacturing processes, in-process controls and quality tests. Each batch is released only after passing our chemical analysis and application tests designed to confirm the suitability of the material for the evaporation process.

Handling precautions

Product safety information required for safe use is not included in this document. Before handling, read product and safety sheets and container labels for safe use, physical and health hazard information. The material safety data sheet is available online at www.patinal.com, from your EMD representative or distributor, or by calling your global Merck KGaA, Darmstadt, Germany, contact.

Disclaimer

Products are warranted to meet the specifications set forth on their label/packaging and/or certificate of analysis at the time of shipment or for the expressly stated duration. EMD MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE REGARDING OUR PRODUCTS OR ANY INFORMATION PROVIDED IN CONNECTION THEREWITH. Customer is responsible for and must independently determine suitability of EMD's products for customer's products, intended use and processes, including the non-infringement of any third parties' intellectual property rights. EMD shall not in any event be liable for incidental, consequential, indirect, exemplary or special damages of any kind resulting from any use or failure of the products: All sales are subject to EMD's complete Terms and Conditions of Sale. Prices are subject to change without notice. EMD reserves the right to discontinue products without prior notice.

EMD, EMD Performance Materials, the vibrant M, Patinal are trademarks of Merck KGaA, Darmstadt, Germany.

