Product Information

Gadolinium Fluoride Patinal®

GENERAL INFORMATION

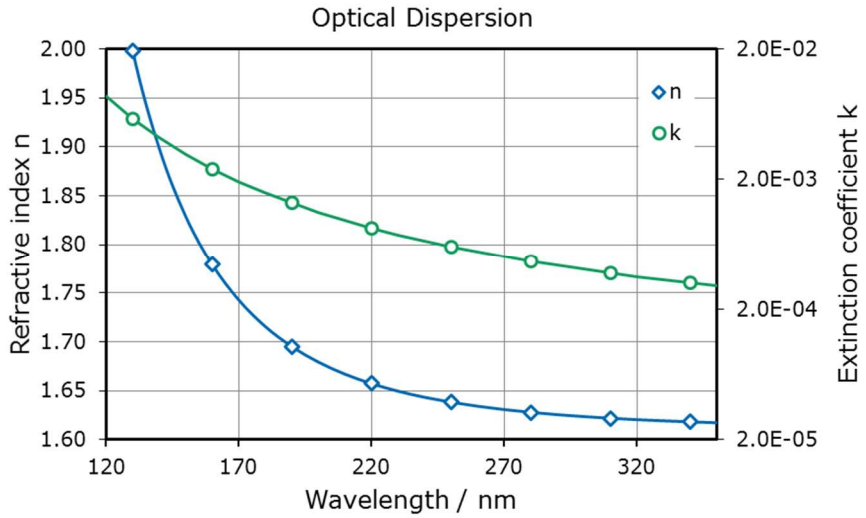
Among the lanthanide trifluorides Gadolinium Fluoride Patinal® (GdF_3) exhibits a high band gap energy and high refractive index. It can be used for example in optical coatings for DUV/VUV applications.

AREAS OF APPLICATION

- High index material for DUV / VUV multilayer coatings, e.g. at 157 nm (F2 excimer laser)

THIN FILM PROPERTIES

Range of transparency	150 nm – 11 µm
Refractive index at 190 nm	
• conventional T_s = 300 °C / no IAD	~1.70
Absorption edge	150nm
Thin film stress	Tensile



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* EMD Performance Materials is a business of Merck KGaA, Darmstadt, Germany

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	1.998	1.779	1.696	1.657	1.638	1.628	1.618
k	5.8E-03	2.4E-03	1.3E-03	8.5E-04	6.1E-04	4.7E-04	3.2E-04

NOTES FOR EVAPORATION

Evaporator source	Molybdenum or tungsten boat Electron beam evaporator
Boat / liner	Mo or W boat Copper crucible
Deposition rate	about 0.6 nm/s
Substrate temperature	250 – 350 °C
QCR-settings	Density 7.1 g/cm³, z-ratio 1.0

GdF_3 can be deposited by e-beam and boat evaporation. GdF_3 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 GdF_3 show columnar crystalline growth. GdF_3 grows in an orthorhombic crystal structure. GdF_3 thin films deposited onto CaF_2 substrates show reduced inhomogeneity and higher density compared to thin films on fused silica substrates due to hetero-epitaxial growth.

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PRODUCTS

Gadolinium Fluoride Patinal® is available as granules.

Product Code	Description	Purity*	Dimensions
1.07014	Gadolinium Fluoride Granules Patinal®	≥ 99.95 % (3N5)	Granules, about 1- 6 mm

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

Appearance	
1.07014	White granules

SPECIFICATION

Cobalt (Co)	≤ 0.005 %
Copper (Cu)	≤ 0.005 %
Chromium (Cr)	≤ 0.005 %
Iron (Fe)	≤ 0.005 %
Manganese (Mn)	≤ 0.005 %
Oxygen (O)	≤ 0.1 %

RoHS information

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

Sizes	
1.07014	Granules 1 - 6 mm ≥ 80 %

Application test

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

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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

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