

Product Information

Neodymium Fluoride Patinal®

GENERAL INFORMATION

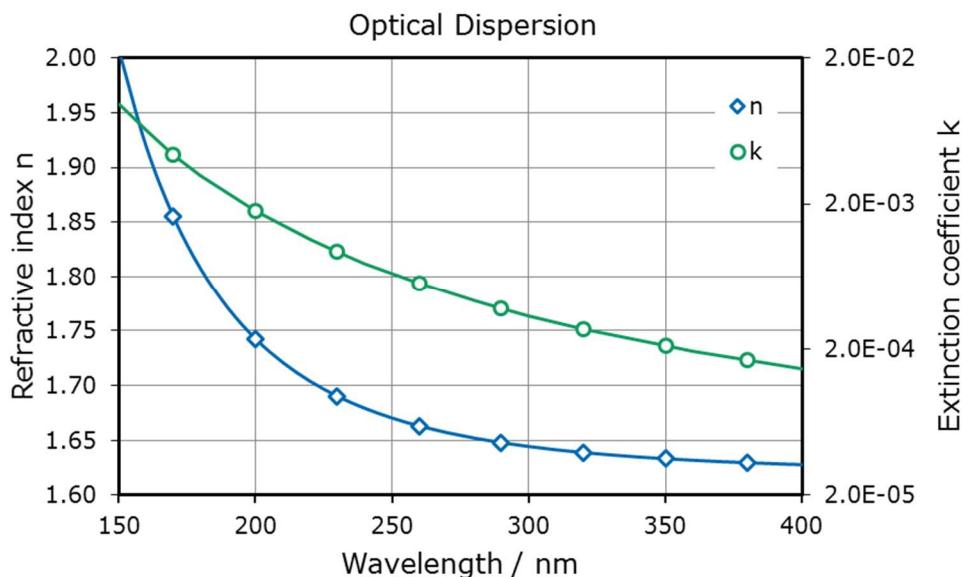
Neodymium Fluoride Patinal® (NdF_3) is used as a high index material for optical multilayer coatings in the UV spectral range.

AREAS OF APPLICATION

- High index material for DUV / VUV multilayer coatings, e.g. at 193 nm (ArF excimer laser)

THIN FILM PROPERTIES

Range of Transparency	170 nm - 14 μm
Refractive index at 190 nm	
• conventional $T_s = 300 \text{ }^\circ\text{C}$ / no IAD	1.77
Thin film stress	Tensile



Status: 08 / 2019, Page **1 of 4**

EMD Performance Materials*

1200 Intrepid Ave, Suite 300 / Philadelphia, PA / 19112 USA

+888 367 3275 / photonicsUS@emdgroup.com / patinal.com

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

wavl / nm	170	200	230	260	290	320	380
n	1.855	1.743	1.690	1.663	1.648	1.639	1.630
k	4.4E-03	1.8E-03	9.4E-04	5.7E-04	3.8E-04	2.7E-04	1.7E-04

Neodymium fluoride shows very weak absorption bands in the VIS wavelength range at 353, 520 and 575-580 nm. Coatings made from NdF₃ have a lower LIDT than LaF₃ at 193 nm, but it is very suitable for coatings at 248 nm.

NOTES FOR EVAPORATION

Evaporator source	Resistance heated evaporator
Boat	Molybdenum, copper
Evaporation temperature	1200 – 1600 °C
Deposition rate	~0.6 nm/s
Substrate temperature	250 - 300°C
QCR-settings	Density 6.506 g/cm ³ , z-ratio 1.0



Status: 08 / 2019, Page **2 of 4**

EMD Performance Materials*

1200 Intrepid Ave, Suite 300 / Philadelphia, PA / 19112 USA

+888 367 3275 / photronicsUS@emdgrou.com / patinal.com

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

PRODUCTS

Product Code	Description	Purity*	Dimensions
1.06739	Neodymium Fluoride Granules Patinal®	≥ 99.95 % (3N5)	Granules, about 1 – 4 mm

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

Appearance

1.06739	Brown-violet
---------	--------------

SPECIFICATION

Calcium (Ca)	≤ 0.005 %
Cerium (Ce)	≤ 0.002 %
Cobalt (Co)	≤ 0.005 %
Copper (Cu)	≤ 0.005 %
Chromium (Cr)	≤ 0.005 %
Iron (Fe)	≤ 0.005 %
Manganese (Mn)	≤ 0.005 %
Lead (Pb)	≤ 0.01 %
Praseodymium (Pr)	≤ 0.005 %
Oxygen (O)	≤ 0.1 %

Sizes

1.06739	Granules 1 - 4 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.



Status: 08 / 2019, Page **3** of **4**

EMD Performance Materials*
1200 Intrepid Ave, Suite 300 / Philadelphia, PA / 19112 USA
+888 367 3275 / photronicsUS@emdgroupp.com / patinal.com

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

Quality assurance

Research, production and sales of our Patinal® evaporation materials take place under a certified DIN EN ISO 9001 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.



Status: 08 / 2019, Page **4 of 4**

EMD Performance Materials*

1200 Intrepid Ave, Suite 300 / Philadelphia, PA / 19112 USA

+888 367 3275 / photronicsUS@emdgroupp.com / patinal.com

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