

Aluminium Fluoride Patinal®

GENERAL INFORMATION

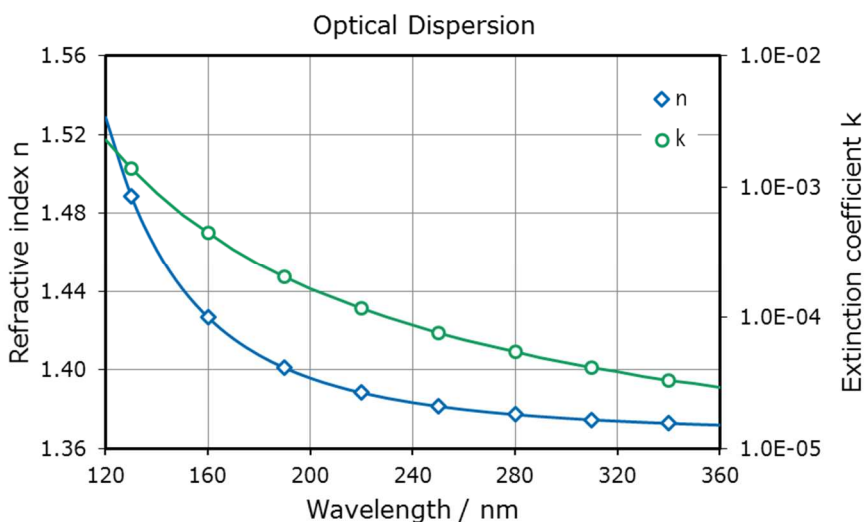
Aluminium fluoride is a low refractive index material especially suited for coatings in the UV, but also in the VIS and IR spectral range.

AREAS OF APPLICATION

- AR and HR coatings for laser optics in the VUV and DUV (e.g. at excimer wavelengths 157 nm, 193 nm, 222 nm ...)

THIN FILM PROPERTIES

Range of transparency	150 nm – 10 µm
Refractive index at	
• 220 nm	~ 1.39 – 1.41
• 550 nm	~ 1.36
• 3 µm	~ 1.28 – 1.30
Absorption edge	~ 150 nm
Thin film stress	Tensile (low)



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	1.489	1.427	1.401	1.388	1.381	1.377	1.373
k	1.4E-03	4.5E-04	2.1E-04	1.2E-04	7.6E-05	5.5E-05	3.3E-05

AlF₃ thin films show an amorphous structure. They exhibit reduced thin film stress and lower surface roughness compared to MgF₂.

NOTES FOR EVAPORATION

Evaporator source	Preferred: resistance heater thermal evaporation Electron beam evaporator
Liner / boat	Mo or Ta boat Copper crucible
Evaporation temperature	800 – 1000 °C
Deposition rate	1.0 – 2.0 nm/s
Substrate temperature	30 – 350 °C, pref. 250 – 350 °C
QCR-settings	Density 2.88 g/cm ³ , z-ratio 1.0

E-beam evaporation of AlF₃ is possible, but usually avoided, due to the tendency of AlF₃ to show stronger spitting compared to MgF₂ and the other UV fluorides. Evaporation from a baffled box is recommended to achieve low defect densities. A substrate temperature in the range of 250 to 350 °C is required for dense film structures.



PRODUCTS

Aluminium Fluoride Patinal® is available as granules.

Product Code	Description	Purity*	Dimensions
1.01600	Aluminium Fluoride Granules Patinal®	≥ 99.99 % (4N)	Granules, about 1 – 4mm

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

Appearance

1.01600	White to colorless
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SPECIFICATION

Cobalt (Co)	≤ 0.001 %
Copper (Cu)	≤ 0.001 %
Chromium (Cr)	≤ 0.001 %
Iron (Fe)	≤ 0.002 %
Manganese (Mn)	≤ 0.001 %
Oxygen (V)	≤ 0.15 %

Sizes

1.01600	Granules 1 - 4 mm ≥ 80 %
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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 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.

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Date of Issue: 12 / 2021, Page 4 of 4

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mail: photonicsUS@emdgroup.com / web: patinal.com

