

## Chromium Patinal®

### GENERAL INFORMATION

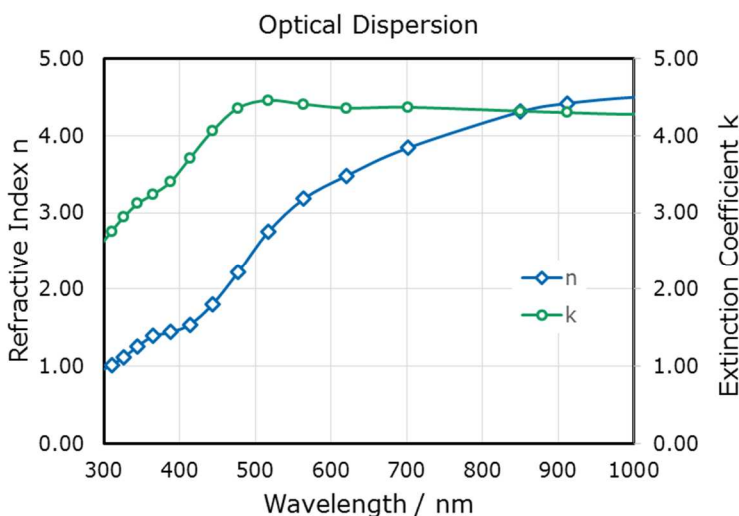
Thin films made from Chromium Patinal® show a reflection of about 60% in the visible spectrum. Chromium forms environmentally durable layers and can therefore be used to make first surface mirrors. It can also be used in metal dielectric combinations to design neutral density filters and coatings with enhanced absorption (Cr-Black).

### AREAS OF APPLICATION

- Adhesion promoter on polymers and metal coatings
- Resistive coats and adhesive layers for gold, aluminium and copper in electronics
- Beam splitters, grey filters, scales and adhesion promoters for gold, aluminium and the like on glass
- Corrosion protection in the automotive industry, low friction layers (razor blades) and decorative layers

### THIN FILM PROPERTIES

Reflectivity at 500 nm	~ 65%
Thin film stress	Tensile (high)



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mail: [photonicsUS@emdgroup.com](mailto:photonicsUS@emdgroup.com) / web: [patinal.com](http://patinal.com)



wavl / nm	350	450	550	700	850	1000
n	1.30	2.02	2.79	3.67	4.13	4.29
k	3.21	3.86	4.20	4.25	4.14	4.07

Chromium metal is widely used as an adhesion promoter in thicknesses between 2 and 50 nm. A typical coating thickness as an adhesion layer, e.g. under an aluminium mirror, is about 30 nm.

## NOTES FOR EVAPORATION

Evaporator source	Resistance heated thermal evaporator Electron beam evaporator
Boat / Liner	W boat or Liner
Evaporation temperature	~1300 °C
Deposition rate	> 2 nm/s
Chamber pressure	< 2·10 <sup>-5</sup> mbar
Substrate temperature	RT – 80 °C
QCR-settings	Density 7.2 g/cm <sup>3</sup> , z-ratio 0.305

Chromium can be deposited from tungsten boats or filaments, or by electron beam gun. It sublimes at temperatures above 1000 °C under evaporation conditions.

The characteristics of vapor deposited films depend on the vapor deposition conditions and are influenced in particular by oxygen and water vapor partial pressure, deposition rate and substrate temperature. The adhesion of chromium layers on glass or ceramic is greatly reduced by very minute traces of oxygen. The resistivity and the temperature coefficient are likewise also affected by such traces.

The condition of the surface to be deposited also influences the thin film properties. Pre cleaning by glow-discharge or plasma/ion cleaning is recommended.



## PRODUCTS

Chromium Patinal® is available as powder, granules and discs.

Product Code	Description	Purity*	Dimensions
1.12997	Chromium Powder Patinal®	≥ 99.5 % (2N5)	Powder, less than 0.3 mm
1.11807	Chromium Granules Patinal®	≥ 99.5 % (2N5)	Granules, about 1 - 4 mm
1.39487	Chromium Granules Patinal®	≥ 99.5 % (2N5)	Granules, about 2 - 4 mm

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

### Appearance

1.12997	Grey powder
1.11807	Grey granules
1.39487	Grey granules

## SPECIFICATION

Cobalt (Co)	1.12997 ≤ 0.01 %
	1.11807 ≤ 0.001 %
	1.39487 ≤ 0.001 %
Copper (Cu)	≤ 0.001 %
Iron (Fe)	≤ 0.2 %
Manganese (Mn)	≤ 0.001 %
Vanadium (V)	≤ 0.05 %

Sizes	
1.12997	powder < 0.315 mm ≥ 90 %
1.11807	granules 1 - 4 mm ≥ 80 %
1.39487	granules 2 - 4 mm ≥ 80 %

### RoHS information

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

### Application test

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



## 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](http://www.patinal.com), from your EMD representative or distributor, or by calling your global Merck KGaA, Darmstadt, Germany, contact.

## Disclaimer

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