

Product Information

Silver Patinal®

GENERAL INFORMATION

Thin films made from Silver Patinal® show a reflectivity of about 97% in the visible spectrum. Silver forms highly reflective but very sensitive surfaces, therefore it requires proper protective coatings to avoid tarnishing of the coating.

AREAS OF APPLICATION

- Coatings for electronics and conductor lines
- Highly reflective mirrors
- Metal dielectric beam splitters

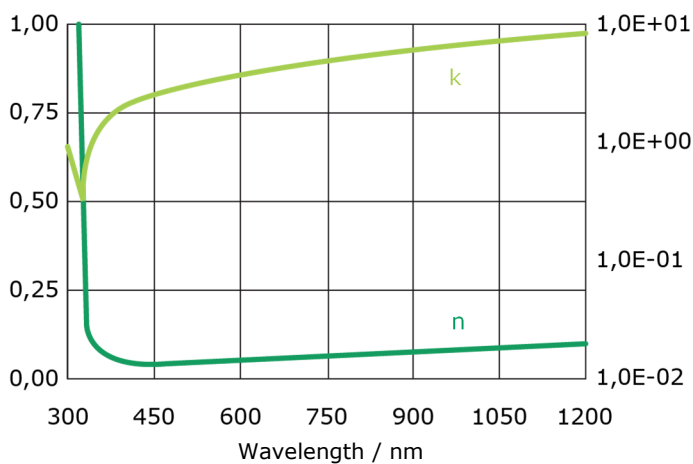
THIN FILM PROPERTIES

Reflectivity

at 500 nm	~ 97 %
at 1 µm	~ 99 %
at 10 µm	~ 99 %

Thin film stress Tensile

Optical Dispersion



wavl / nm	350	450	550	650	850	1050
n	0.076	0.041	0.044	0.051	0.070	0.093
k	1.327	2.676	3.610	4.460	6.077	7.648

NOTES FOR EVAPORATION

Evaporator source	Resistance heated thermal evaporator Electron beam evaporator
Boat / liner	Mo, Ta or W Boat Graphite liner
Evaporation temperature	1000 – 1200 °C
Deposition rate	> 1 nm/s
Chamber pressure	< 1·10 ⁻⁵ mbar
Substrate temperature	RT – 80 °C
QCR-settings	Density 10.5 g/cm ³ , z-ratio 0.529

The characteristics of silver thin films depend on the deposition conditions and are influenced in particular by oxygen and water vapor partial pressure, deposition rate, film thickness and substrate temperature. Furthermore the surface roughness of the substrate has a direct influence on the final reflectivity. To achieve high reflective silver films a high deposition rate, very low chamber pressure and low substrate temperature are required. Slight changes in the process conditions can have a high impact on the final reflectance of the coating. Silver thin films should have a thickness of less than 120 nm for maximum reflectance, thick layers tend to show increased roughness, which enhances scatter and therefore reduces reflectivity.



PRODUCTS

Silver Patinal® is available as granules.

Product Code	Description	Purity*	Dimensions
1.01502	Silver Granules Patinal®	≥ 99.95 % (3N5)	Granules, about 1 – 4 mm

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

Appearance

1.01502	Silver white granules
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SPECIFICATION

Cobalt (Co)	≤ 0.0005 %
Chromium (Cr)	≤ 0.0005 %
Copper (Cu)	≤ 0.0075 %
Iron (Fe)	≤ 0.0005 %
Lead (Pb)	≤ 0.0010 %
Vanadium (V)	≤ 0.0005 %
Zinc (Zn)	≤ 0.0005 %

Sizes

1.01502	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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