

Substance L5 and L5 HD Patinal®

GENERAL INFORMATION

Substance L5 Patinal® is a low refractive index mixture of silicon dioxide and aluminium oxide. It was developed to provide an evaporation material for the deposition of low index thin films particularly well suited for plastic substrates. The material enables very durable and highly transparent coatings on cold substrates made of plastics. To obtain higher density films, Substance L5 Patinal® can also be deposited using Ion Assisted Deposition (IAD). Coatings made with Substance L5 Patinal® show an increased density and improved stability against damp heat.

Substance L5 HD Patinal® granules feature a higher density compared to standard Substance L5 granules, permitting a larger quantity of material in the crucible per filling. Substance L5 HD tablets show a density of approx. 2.2 g/cm³, which is close to the bulk density of fused silica.

AREAS OF APPLICATION

- Durable AR and on plastics and glasses
- Filter coatings on plastics and glasses

THIN FILM PROPERTIES

Range of Transparency	200 nm - ~3 µm
Refractive index at 500 nm	1.48
Absorption edge	220 nm
Thin film stress	Compressive



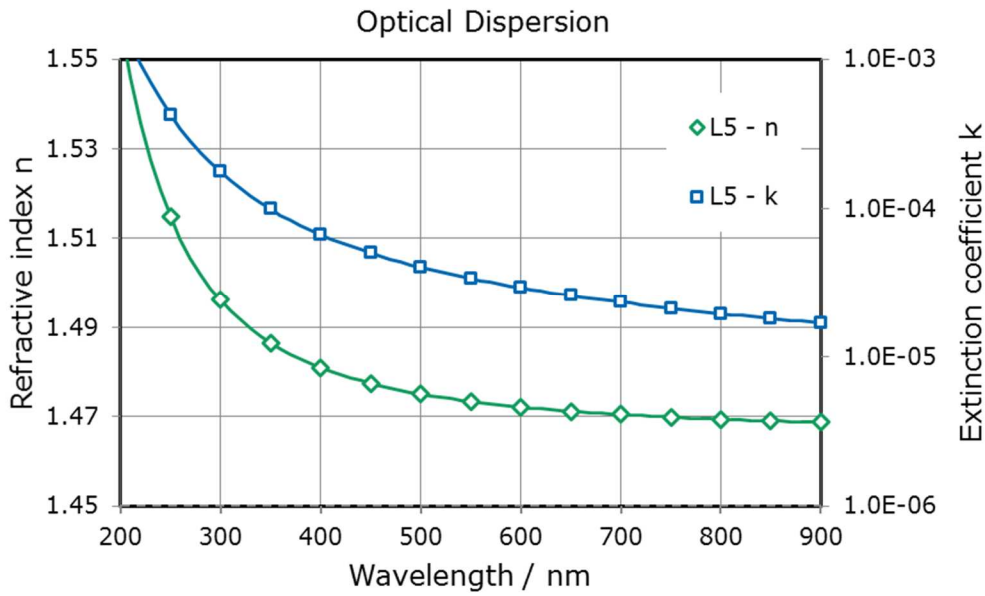
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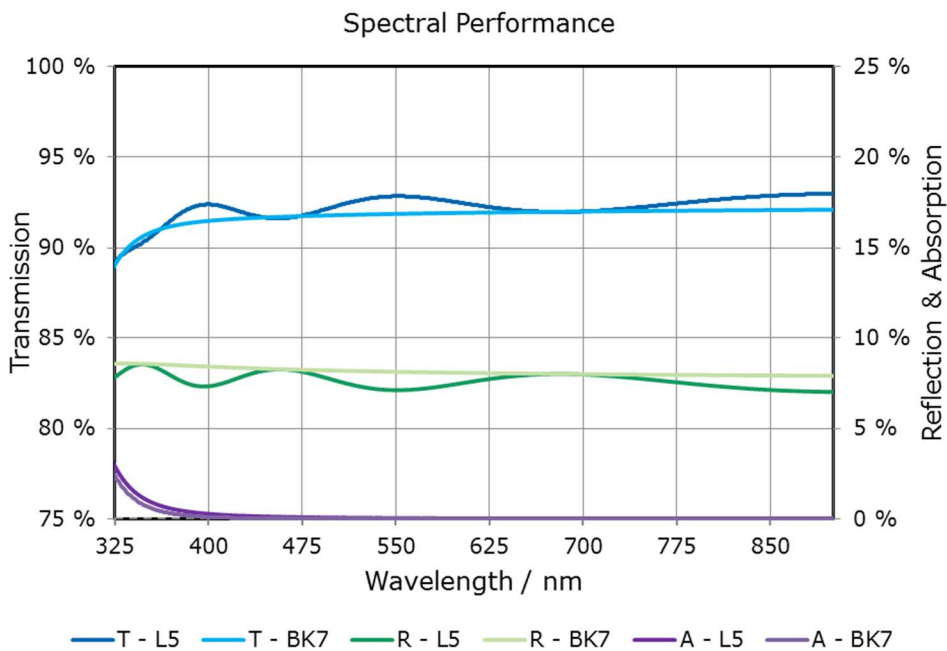
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λ / nm	250	350	450	550	650	750	850
n	1.515	1.487	1.477	1.473	1.471	1.470	1.469
k	4.3E-04	9.9E-05	5.0E-05	3.4E-05	2.6E-05	2.3E-05	1.8E-05

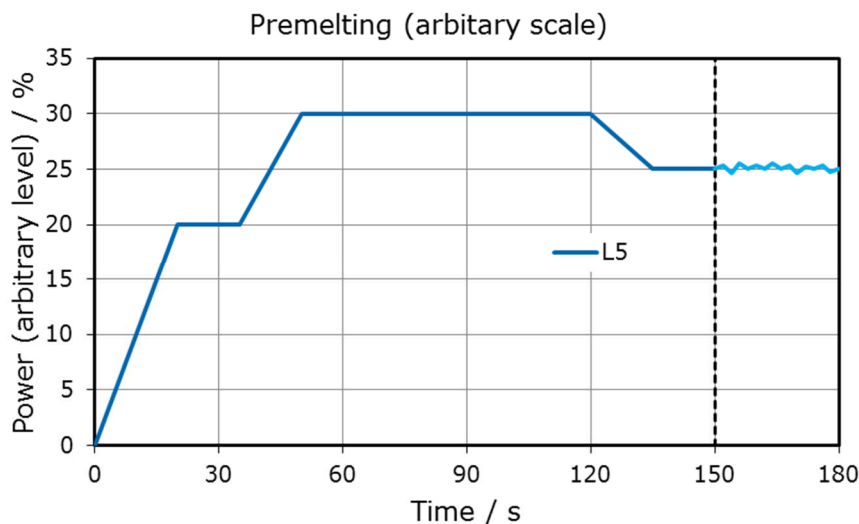


NOTES FOR EVAPORATION

Evaporator source	Electron beam evaporator
Liner	Copper crucible
Evaporation temperature	about 2000 °C
Deposition rate	0.2 – 0.8 nm/s
Oxygen partial pressure	about $1 \cdot 10^{-4}$ mbar
Substrate temperature	30 - 350 °C
QCR-settings	Density 2.2 g/cm ³ , z-ratio 1.0

Substance L5 Patinal® requires e-beam heating. An additional liner is not required for the evaporation from the copper crucible. Premelting the material below a shutter is necessary to achieve a stable evaporation rate. Substance L5 Patinal® melts in a thin surface layer similar to SiO₂. It is recommended to apply the electron beam energy homogeneously onto the Substance L5 granules in the crucible pocket to maintain a flat molten surface. Substance L5 HD tablets require a focused e-beam energy distribution to achieve a stable evaporation rate.

The following figure shows the recommended preconditioning process:



PRODUCTS

Product Code	Description	Purity*	Dimensions
1.01835	Substance L5 Granules Patinal®	≥ 99.95 % (3N5)	Granules, about 1 – 2 mm
1.08322	Substance L5 Granules Patinal®	≥ 99.95 % (3N5)	Granules, about 0.5 – 4 mm
1.00231	Substance L5 HD Granules Patinal®	≥ 99.95 % (3N5)	Granules, about 1 – 2 mm
1.00458	Substance L5 HD Tablets Patinal®	≥ 99.95 % (3N5)	Tablets, about 8 g, Ø 19.5 mm x h 11.5 mm

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

Appearance

1.01835, 1.08322	light-colored
1.00231	light-colored
1.00458	light-colored

SPECIFICATION

Cobalt (Co)	≤ 0.001 %
Copper (Cu)	≤ 0.001 %
Chromium (Cr)	≤ 0.001%
Iron (Fe)	≤ 0.03 %
Vanadium (V)	≤ 0.001 %

RoHS information

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

Sizes

1.01835	Granules 1- 2 mm ≥ 80 %
1.08322	Granules 0.5 - 4 mm ≥ 80 %
1.00231	Granules 1 – 2 mm ≥ 80 %
1.00458	m = 7.6 – 8.2 g h = 11.0 – 12.0 mm Ø = 19.0 – 20.0 mm

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, from your EMD representative or distributor, or by calling your global Merck KGaA, Darmstadt, Germany, contact.

Disclaimer

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