

Substance M3 Patinal®

GENERAL INFORMATION

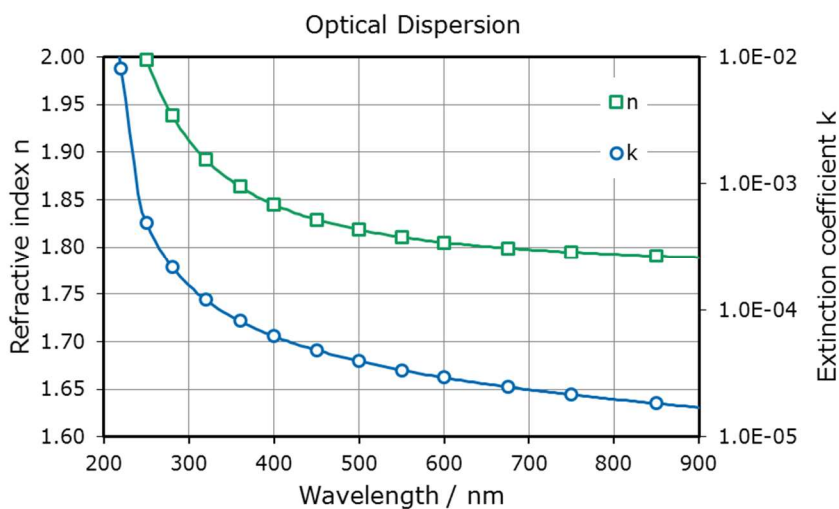
Substance M3 Patinal® (aluminium lanthanum oxide) is a medium refractive index material for evaporation, covering a wide transmission range from UV to IR. Its refractive index fills a gap not available from non-mixture materials. Since layer stress can be influenced through the adjustment of coating conditions, Substance M3 Patinal® provides additional freedom for the design of high performance optical multilayers on a variety of substrate materials.

AREAS OF APPLICATION

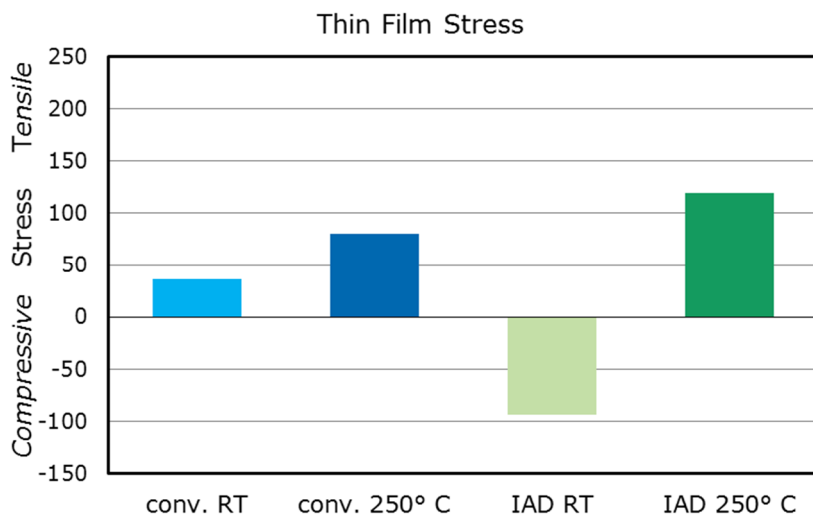
- AR coatings for UV, VIS and NIR
- Multilayer coatings for filters, mirrors, beam splitters etc.

THIN FILM PROPERTIES

Range of transparency	230 nm – 10 µm
Refractive index at 500 nm	
• conventional $T_s = RT$ / no IAD	~ 1.71
• conventional $T_s = 250\text{ °C}$ / no IAD	~ 1.81
• conventional $T_s = RT$ / IAD	~ 1.75
Thin film stress	Compressive to tensile



wavl / nm	230	250	350	500	700	900
n	2.06	2.00	1.87	1.82	1.80	1.79
k	2.6E-3	4.9E-4	8.9E-5	3.9E-5	2.4E-5	1.7E-5



Condition	Film thickness / nm	Stress σ / MPa
conv. RT	355	36
conv. 250° C	359	80
IAD RT	346	-94
IAD 250° C	355	120

Film stress was measured for different process conditions with and without substrate heating and ion assistance. The measurements were performed with a Toho Technology Corp FLX-2320-S two weeks after the deposition process.



NOTES FOR EVAPORATION

Evaporator source	Electron beam evaporator
Crucible	Molybdenum liner
Evaporation temperature	2100 °C
Deposition rate	0.2 – 0.8 nm/s
Oxygen partial pressure	$2 \cdot 10^{-4}$ mbar
Substrate temperature	30 - 350 °C
QCR-settings	Density 5.2 g/cm ³ , z-ratio 1.0

Substance M3 Patinal® is a fully melting material. Prior to deposition of the coatings the material has to be pre-melted below a shutter. For the production of multilayer coatings it is necessary to refill the crucible pocket in multiple steps. It can be regularly refilled after each batch.

PRODUCTS

Product Code	Description	Purity*	Dimensions
1.09952	Substance M3 Patinal®	≥ 99.95 % (3N5)	Granules , about 1 - 4 mm

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

Appearance

1.09952	Off-white granules
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SPECIFICATION

Cobalt (Co)	≤ 0.005 %	Sizes	1.09952	Granules 1- 4 mm ≥ 80 %
Copper (Cu)	≤ 0.005 %			
Iron (Fe)	≤ 0.01 %	Application test	Each batch has to pass a specific application test assessing its evaporation behaviour.	
Manganese (Mn)	≤ 0.005 %			
Vanadium (V)	≤ 0.005 %			

RoHS information

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



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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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