

Product Information

Substance M2 Patinal®

GENERAL INFORMATION

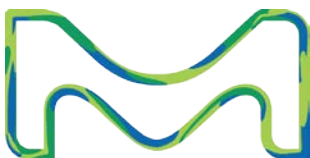
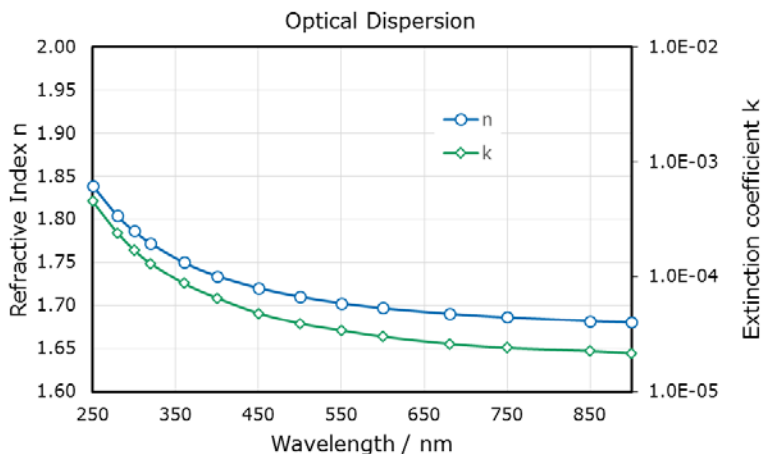
Substance M2 Patinal® (Aluminium Lanthanum Oxide) is a medium refractive index material for evaporation, covering a wide spectral range from UV to IR. Its refractive index fills a gap not available from non-mixture materials. Since layer stress can be influenced through the adjustment of coating conditions, substance M2 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 on glass and polymers
- Multilayer coatings for filters, mirrors, beam splitters, polarizers etc.

THIN FILM PROPERTIES

Range of Transparency	220 nm – 10 µm
Refractive index at 500 nm	
• conventional $T_s = RT$ / no IAD	1.68
• conventional $T_s = 250\text{ °C}$ / no IAD	1.73
• conventional $T_s = RT$ / IAD	1.70
Thin film stress	Compressive to tensile

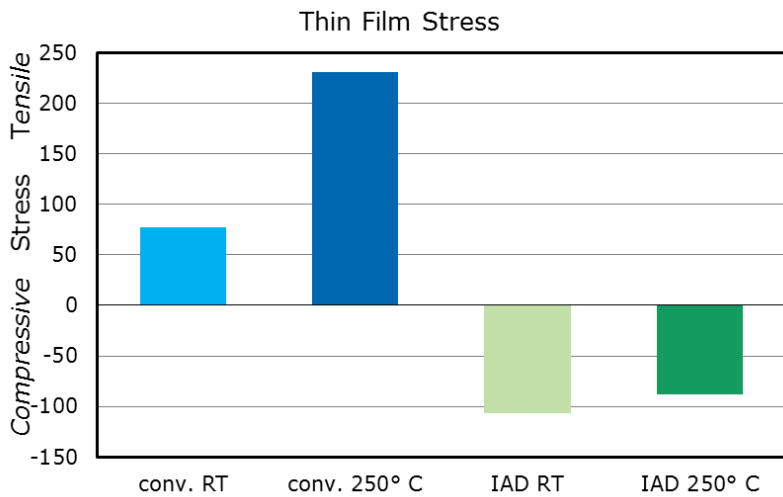


Status: 07 / 2016, Page 1 of 6

EMD Performance Materials*
 One International Plaza Suite 300 / Philadelphia, PA / 19113 USA
 +888 367 3275 / photonicsUS@emdgroup.com / patinal.com

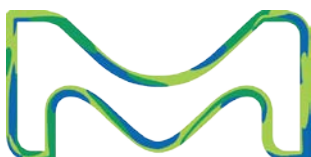
* EMD Performance Materials is a business of Merck KGaA, Darmstadt, Germany

wavl / nm	220	250	350	500	700	900
n	1.91	1.84	1.76	1.72	1.70	1.70
k	1.2E-3	3.8E-4	9.8E-5	4.7E-5	2.9E-5	2.1E-5



Condition	Film thickness / nm	Stress σ / MPa
conv. RT	354	77
conv. 250° C	351	231
IAD RT	350	-107
IAD 250° C	359	-88

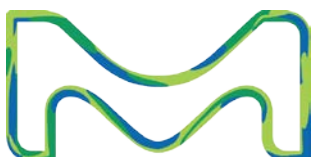
Film stress was measured for different process conditions with and without substrate heating and ion assistance. The measurements were performed with a Toho Technology Corp FLX-2320-S two weeks after the deposition process.



NOTES FOR EVAPORATION

Evaporator source	Electron beam evaporator
Liner	Molybdenum, Copper
Evaporation temperature	2100 °C
Deposition rate	0.2 – 0.8 nm/s
Oxygen partial pressure	$2 \cdot 10^{-4}$ mbar
Substrate temperature	30 to 350 °C
OCR-settings	Density 4.2 g/cm ³ , z-ratio 1.0

Substance M2 Patinal® is a fully melting material. Prior to deposition, 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
1.09941	Substance M2 Granules Patinal®	≥ 99.95 % (3N5)	Granules, about 1 – 4 mm

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

Appearance

1.09941	off-white granules
---------	--------------------

SPECIFICATION

Cobalt (Co)	≤ 0.005 %
Copper (Cu)	≤ 0.005 %
Iron (Fe)	≤ 0.005 %
Manganese (Mn)	≤ 0.005 %
Vanadium (V)	≤ 0.005 %

Sizes

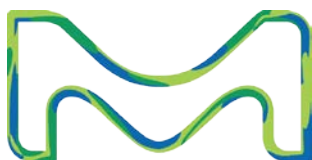
1.09941	Granules 1- 4 mm ≥ 80 %
---------	----------------------------

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 9001:2000 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.

Application disclaimer

We provide information and advice on application technologies and relevant regulations based upon our current knowledge and opinion. WE MAKE NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, WITH RESPECT TO SUCH INFORMATION OR ITS APPLICATION. Customers must independently determine the suitability of our products for the customer's intended product, use or process. Customer is responsible for observing all laws and regulations relevant to such products, uses or processes. The foregoing information and suggestions are also provided without warranty of non-infringement as to intellectual property rights of third parties and shall not be construed as any inducement to infringe the rights of third parties. Customer shall be responsible for obtaining any applicable third party intellectual property licenses. Any reference from our literature requires prior written consent and in any reference the source shall be stated.

Disclaimer

Products are warranted to meet the specifications set forth on their label/packaging and/or certificate of analysis at the time of shipment or for the expressly stated duration. EMD MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE REGARDING OUR PRODUCTS OR ANY INFORMATION PROVIDED IN CONNECTION THEREWITH. Customer is responsible for and must independently determine suitability of EMD's products for customer's products, intended use and processes, including the non-infringement of any third parties' intellectual property rights. EMD shall not in any event be liable for incidental, consequential, indirect, exemplary or special damages of any kind resulting from any use or failure of the products: All sales are subject to EMD's complete Terms and Conditions of Sale. Prices are subject to change without notice. EMD reserves the right to discontinue products without prior notice.

EMD, EMD Performance Materials, the vibrant M, Patinal are trademarks of Merck KGaA, Darmstadt, Germany.

