

Substance H8 Patinal®

GENERAL INFORMATION

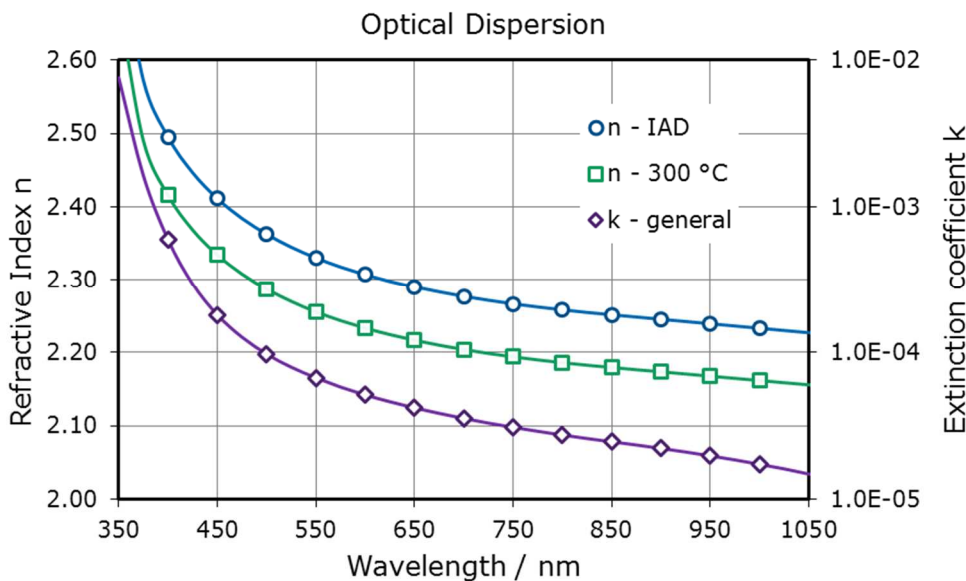
Substance H8 Patinal® is a high refractive index material composed of a mixture of titanium oxide and niobium oxide. It was developed for coatings on polymers with focus on stable evaporation conditions, low thermal substrate load and excellent UV-blocking.

AREAS OF APPLICATION

- Ophthalmics, AR coatings on polymers
- BBAR coatings for precision optics

THIN FILM PROPERTIES

| | |
|---|---------------|
| Range of Transparency | 380 nm – 8 μm |
| Refractive index at 500 nm | |
| • conventional $T_s = 300\text{ °C}$ / no IAD | ~ 2.30 |
| • IAD – $T_s = \text{RT}$ | ~ 2.35 |
| Thin film stress | Tensile |



| | | | | | | | |
|-------------|--------|---------|---------|---------|---------|---------|---------|
| wavl / nm | 375 | 425 | 500 | 600 | 750 | 900 | 1050 |
| n - 300 °C | 2.68 | 2.37 | 2.29 | 2.23 | 2.19 | 2.17 | 2.16 |
| n - IAD | 2.57 | 2.45 | 2.36 | 2.31 | 2.27 | 2.25 | 2.23 |
| k - general | 7.6E-3 | 3.0E-04 | 9.8E-05 | 5.1E-05 | 6.4E-05 | 2.2E-05 | 1.6E-05 |

The material can be used as a high index layer in a BBAR coating design. In combination with ZrO₂, the substance can be used to optimize the admittance of the design. Compared to a pure ZrO₂-design Substance H8 Patinal® improves resistance against temperature induced thin film cracking.

NOTES FOR EVAPORATION

| | |
|----------------------------|--|
| Evaporator source | Resistance heated evaporator Electron beam evaporator |
| Boat / Liner | Mo-Boat Mo-Liner |
| Melting temperature | 1490 °C |
| Deposition rate | 0.2 – 0.4 nm/s |
| Oxygen partial pressure | about 2·10 ⁻⁴ mbar |
| IAD settings (Leybold APS) | IAD with O ₂ APS Bias Voltage 80-120 V, 30 sccm O ₂ |
| Substrate temperature | conventional 150 – 300 °C, pref. 300 °C RT – 300 °C, pref. RT |
| QCR-settings | Density 4.4 g/cm ³ , z-ratio 1.0 |

Due to its low melting temperature of 1490 °C, Substance H8 Patinal® reduces the thermal load on polymers and therefore is the ideal choice for coatings on polymer substrates. Thermal evaporation of Substance H8 Patinal® can thus be used to deposit a starting layer for UV radiation protection of polymer substrates.

E-gun evaporation of Substance H8 Patinal® requires the usage of a molybdenum liner and thorough pre-melting. The liner can be regularly refilled after each run. After about 20 coating runs the melt has to be renewed for stable mechanical properties of the deposited film.

To avoid absorption, a high oxygen flow and ion assistance during deposition are recommended. Caution should be used, though, since high ion energies can lead to increased absorption.



PRODUCTS

Substance H8 Patinal® is available as granules.

| Product Code | Description | Purity* | Dimensions |
|--------------|--------------------------------|-----------------|--------------------------|
| 1.00237 | Substance H8 Granules Patinal® | ≥ 99.95 % (3N5) | Granules, about 1 – 4 mm |

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

Appearance

| | |
|---------|----------------|
| 1.00237 | White granules |
|---------|----------------|

SPECIFICATION

| | |
|---------------|-----------|
| Cobalt (Co) | ≤ 0.001 % |
| Copper (Cu) | ≤ 0.001 % |
| Chromium (Cr) | ≤ 0.002 % |
| Iron (Fe) | ≤ 0.01 % |
| Vanadium (V) | ≤ 0.005 % |

Sizes

| | |
|---------|----------------------------|
| 1.00237 | 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 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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