MATERION

COATING MATERIAL NEWS

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COMMONALITIES BETWEEN UV AND IR MATERIALS

Breaking the Spectral Overlap Rules

The choice of materials employed in coating designs is primarily differentiated by the operating wavelength range. The available materials are, however, not strictly segregated to either short- or long-wavelength candidates, but overlap exist in spectral range applicability. That wavelength overlap permits the designer to deviate from the common set of coating materials in many cases, thereby providing process flexibility.

General Examples of Material Spectral Overlap

In general, materials that transmit IR do not transmit short wavelengths, and vice-versa. This "rule" applies primarily to the high-index materials. Examples are Ge, Si and ZnSe that transmit from the near-IR to LWIR. At the shorter Vis – UV wavelengths, oxide materials are transparent. However, some oxide compounds can be used at UV as well as the MWIR wavelengths. Their longest range is limited to approximately 3000 nm wavelength. Fluoride compounds are the exceptions; they transmit from UV (~200 nm) to LWIR (~11 µm).

The only available low index oxide compound, SiO_2, is transparent between ~220 nm to ~5000 nm, covering UV to MWIR wavelengths. So, combinations of SiO_2 with the high-index component consisting of Ta_2O_5, TiO_2, $Nb2O_5$, or HfO_2 are commonly used for visible-NIR coating designs. HfO_2 may be used in UV coatings. Tantalum pentoxide, Ta_2O_5, is transparent between ~320 nm and ~4000 nm, thus providing the high-index component covering visible to MWIR wavelengths. Read more...

HYPERSPECTRAL COATING CHALLENGES

Challenges to Critical Fluorides

In this edition of CMN we are going to take another look at the challenges specific to hyperspectral coatings. In a previous article[1] we talked about the differences between various grades of SiO_2 where the remnants from chemical reactions can follow the material through deposition and influence thin film performance. In this article we will look into several critical fluoride compounds for UV,VIS & IR films. In the cases of MgF_2, YF_3 and YbF_3, legacy water or mineral impurities can have dramatic consequences. Different processing steps and product evolutions are needed to minimize the risk to customers using these materials for hyperspectral applications.

The challenges with MgF_2 are numerous, and after years of VIS AR dominance some manufacturing approaches have lost favor due to low cost alternatives and the relative ease of supply from sources outside of Europe and the USA. However, the unanticipated result is that sometimes those extra steps and techniques can be critical at different parts of the spectrum. During principle reactions like precipitation, recipes that do not use HF acid for fluorination are susceptible to sulfur, sodium and calcium impurities, which can have negative consequences on melting behavior and spitting. Read more...

IN THIS ISSUE

2017 MRS FALL MEETING & EXHIBIT

MRS 2017 Fall Meeting & Exhibit
Nov 26- Dec 1, 2017
Boston, Massachusetts
Booth #925

MRS 2017 will offer technical sessions, exhibits and quality networking opportunities. As an organization, the Materials Research Society works to advance interdisciplinary materials research. It emphasizes the full spectrum of materials technology and diverse disciplines that contribute to it.

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LED A.R.T. Symposium
ASSEMBLY | RELIABILITY | TESTING

LED A.R.T. Symposium
Nov 28-30, 2017
Research Triangle Park, NC
Display - #1

The LED A.R.T. Symposium is the forum to explore the problems faced - and find solutions - for those in the LED (light emitting diode) industry. This year will provide attendees with information to bridge the gap between the semiconductor physics and the architectural design level issues all along the LED supply chain. It will encompass design, manufacturing, reliability assessment, testing and inspection of LEDs and LED lighting.

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