MATERION

COATING MATERIAL NEWS

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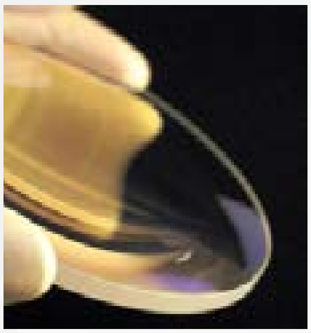
SURVIVAL OF THE FITTEST

Optical Coatings for Harsh Environments



Optical coatings have thicknesses smaller than the thickness of the finest human body hair. Despite this miniscule size, there are applications that demand from them durability and resistance to harsh external forces. Coatings used in terrestrial & space, scientific, commercial, communication, NASA/NOAA, military, and medical applications can suffer potentially damaging or catastrophic failure in their operational environments. The following discusses the environmental challenges faced and how these micrometer-thin layers are designed to be able to survive and function over long-exposure lifetimes.

Terrestrial Applications

In terrestrial applications, thin-film coatings are required to operate and survive in environments that include high humidity, temperature swings, abrasive sand and high-velocity rain impacts, salt water exposure and organic solvent immersion. In previous issues of Coating Materials News (CMN), we have discussed the deposition processes and materials that produce coatings that exhibit the required resistance to these environmental stresses. Briefly, we learned that high-energy deposition processes are employed to produce thin-film layers with morphology that possesses high packing density, low stress, and correct chemical composition. Such deposition processes include ion-assist (IAD), magnetron sputtering (MS), ion-beam sputtering (IBS), atomic layer deposition (ALD), and variations on these techniques. Read more...

CHALLENGES TO HYPERSPECTRAL APPLICATIONS

Material Properties Make the Difference

With thin film industry growth being driven by increasingly complex optical/microelectronic devices, as well as intense photonics and hyperspectral imaging, it may be a good time to take a closer look at properties of materials and why enhanced processes are often critical for the most sophisticated applications. Following, we will address some of the key substances.

Silicon Dioxide (SiO_2)

We will first examine the most critical low-index material in a classical optical stack – Silicon Dioxide (SiO_2). For evaporation or for sputtering, SiO_2 can be crystalline or amorphous in nature – and very easy to overlook when considering expanding capabilities outside of the VIS spectrum. While it is true that physical vapor deposition (PVD) relies on a small group of mature silica products, the role of water and reaction contaminants is the core difference between synthetic SiO2 and Melted/Fused SiO_2. If you observe your SiO_2 granules and compare them to your fused silica (FS) substrates or targets, you will note a series of differences. Beyond the simple fact that the substrate should be far more transparent than irregular granules, the pieces may range from clear to cloudy to the naked eye. Additionally, there are even more dramatic factors and lingering effects. Read more...

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FACE TO FACE

Meet Jaya Pillai, Materials & Trade Compliance Manager for Materion Advanced Materials. Jaya has been with Materion for eleven years and reports to the Director of Supply Chain, Mark Curran. Discussing his main objectives at Materion, Jaya stated, "My number one goal is to ensure that our products reach our customers legally, safely, on-time, intact, and in a cost effective manner."

Jaya's key role is ensuring Materion transactions (domestic, imports, and exports) are in compliance with all applicable government agencies. There are multiple US and international regulations that must be adhered to including those from: the US Dept of Commerce, US Department of State, Homeland Security (DHS), Drug Enforcement Agency (DEA), and hazardous materials regulatory bodies such as the Dept of Transportation (DOT) and the International Air Transport Association (IATA) as well as other international regulations.

While based out of Milwaukee, Wisconsin, Jaya is responsible for all Advanced Materials facilities and locations. "I enjoy working at Materion because it allows me to continually be challenged with new projects," Read more about Jaya...

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