Coating Material **News**

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Inorganic Chemicals & Specialty Thin Film Coatings

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Enhance Your Sputtering Deposition Yield with the Materion Approach

Major users of sputter deposition include equipment manufacturers across many markets: semiconductor, data storage, wireless, optical, hybrid/microelectronics and performance films. The industry goal is to improve sputter processing time, maximize the deposition yield and produce quality end products. Materion addresses each of those objectives with advanced materials solutions.

The Problem

The key challenge in deposition is that only 10-35% of a planar target is utilized in a sputtering environment. That leaves 65-90% of the target unused that will require either recycling or possibly scrapping - both which reduce processing time.

The Solution

Materion has several smarter solutions to enhance target utilization. One of these is installing shunts on the backside of suitable candidate targets to open up erosion zones. This can realize upwards of 10-30% greater utilization of the target. The process involves inserting a ferromagnetic shim on the backside of the target which improves the performance of the magnets in the magnetron assembly. This further expands the erosion zone of the target material and reduces trenching in the erosion zone. Additionally, shunting helps to stabilize power parameters within the performance cycle of the target.
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IR Coating Designs & Applications

The range of wavelengths over which optical coatings perform their various functions is large. UV and Visible light of high photon energies is radiated from solar and artificial light sources. The Short Wave IR (SWIR) and Mid-wave IR (MWIR) regions overlap reflected solar and thermally emitted energies. At LWIR wavelengths, energy is emitted from the source due to its temperature. Optical components and instruments that operate at long wavelengths in the infrared spectrum require a different set of coating materials than those that operate in visible wavelengths. Materion offers a comprehensive range of coating materials, plus our technical experts can determine the optimal coating materials to meet your wavelength requirements. IR materials differ in chemical composition and spectral transmission and are also less mechanically durable than materials used in the Visible and shorter wavelengths. This article will focus on IR coating applications, coating materials, their

In This Issue

Inorganic Chemical Catalog
Materion's Inorganic Chemicals catalog provides a wide variety of materials from Aluminum to Zirconium including Borides, Carbides, Phosphor, Oxides, Silicides, and Thorium compounds.

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properties, and deposition behavior.

Applications for Infrared Optics

Detection and imaging of specific spectral bands of energy within the spectral regions from visible to long-wave IR and their associated wavelengths, are optimized according to requirements and applications. Some examples follow. Energy at wavelengths in the SWIR band is reflected by a remote scene and sensed by orbiting instruments. Or, this energy is reflected by human skin, and used in medical disease sensing and diagnosis. Information is detected as differences between reflected and absorbed wavelengths in these applications. For example, blood oxygenation in the circulatory system can be monitored at specific absorbed wavelengths. Similarly, chlorophyl absorption density is an indicator of vegetation health. In addition to solar natural light, artificial light sources are used outside the visual range of wavelengths. Reference 2 contains visual display images taken with different wavelengths, and illustrates how differences can be detected at wavelengths outside our visually percieved wavelength sensitivity. Referring to Figure 1, at long wave-lengths, the energy emitted by a warm body might exceed the energy reflected by that body's surface. This phenomenon governs the operation of thermal IR sensing in the LWIR. Read More.....

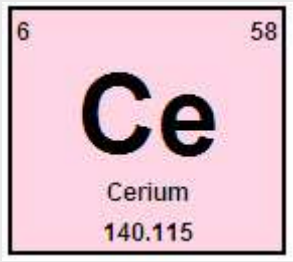
Window Glass: More than Meets the IR!

The windows of commercial buildings and residential homes provide natural lighting for occupants, as well as views to the outside world. The features of the glass are simply taken for granted by the average person, who is ignorant of what goes into their creation. Largely unknown is the technology required for today's "typical" windows to provide energy efficiency as well as superior light transmission. In order to offer these capabilities, the windows must contain advanced performance low-e glass which consists of multiple thin film layers of metallic elements directly coated onto the glass. These thin film layers (ranging from 20-300 Angstroms thick) are responsible for the unique glass properties - and Materion has an essential role in supplying the products that create them.

In order to produce the advanced coatings on the glass, one of the key materials utilized in the thin film layer stack is Silver. Silver acts as the IR reflector and is sputter-deposited on the glass during the manufacturing process. Materion is a key partner in meeting the market demand for delivery of high performance Silver sputtering targets to achieve quality deposition. It is critical that the final product allow light through, while still blocking heat from the sun and cold from winter weather. To meet specific requirements, often the glass will require one, two, or even three separate layers referred to as single, double, and triple Silver

What do you want to know more about?

Inorganic Chemical Corner
"Element of Interest"



Cerium

Cerium is the most abundant of the rare earth elements and has numerous commercial applications. The oxide, nitride and fluoride of Cerium have varied uses in industry. In phosphors, Cerium is the "sensitizer". In catalysis, Cerium is the "stabilizer" for Alumina and enhances NOx reduction of some systems. Cerium is also widely used as both a polishing material and as a coating material for specialty optics. Read More...

Optical Coatings Q & A

IR Coating Designs & Applications

Q. IR sensor optical domes/windows and hypervelocity military aircraft are sample applications that require coatings with extraordinary wear resistance. What is being done to address this problem?

A. Coating materials and deposition processes have been specially developed to meet this challenge. A few considerations: when depositing durable thin film

glass. Read More...

Supporting IR Applications

Infrared (IR) applications requiring optical coatings are used by a range of industries from commercial, aerospace, military to medical. Materion is a premier producer of high purity optical coating materials and features a complete line of evaporation materials to support simple or complex IR applications. We offer a variety of granule sizes suitable for electron beam, as well as resistive-heated evaporation processes for thin film coatings.

The chemistries of our materials are verified at key points in our production processes utilizing our in-house laboratory to ensure consistent, repeatable quality. All Materion Advanced Chemicals products are manufactured in ISO-9001 certified facilities and characterized in ISO-17025 certified analytical laboratories. We also deposit and test thin films of these materials in real world applications to ensure high quality products that are able to support the most demanding application requirements for excellent durability and environmental stability. Read More....

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coatings to surfaces, the chemical composition of the substrates must be considered; an intermediate layer material is often required to initiate strong bonding between substrate and first-coated layer; coating materials used must possess high transmission in the wavelength regions that are transmitted by the substrate; and more. Other options may include a protective coating, double-sided coating or backside durable AR.

Q. Fluoride compounds as starting materials have properties that are potentially problematic during the production of multi-layer coatings. Can their performance be improved?

A. Fluoride compounds with known LWIR transparency are constantly being refined in an attempt to improve their evaporation behavior (water affinity, low packing density and tensile stress). Modification of the preparation procedure is being trialed to reduce these effects. For all fluoride compounds, higher substrate temperatures result in higher packing density and thus lower water band depth; low power applied for up to four minutes also drives off adsorbed water. Other techniques are under development.

Do you have a question about a material for your application?
Contact Chris Helwig, 414-285-5800, Ext. 339.

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