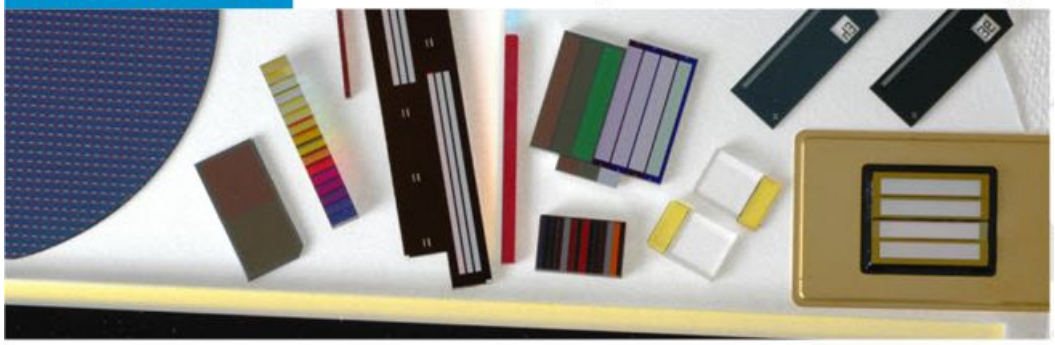
MATERION Barr Precision Optics & Thin Film Coatings



Optical Innovations News
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Materion Products on Mars!

Providing Cutting Edge Optics for Space Missions

A great many companies claim to have products that are "out of this world." At Materion Precision Optics, our products are literally out of this world! We have partnered with the National Aeronautics & Space Administration (NASA) for decades. Together we provide cutting-edge optics that empower some of the most ambitious planet exploration imaginable. Materion has been an integral part of all Mars lander and rovers missions including:

* Pathfinder, 1996
* Phoenix Lander, 2008
* Soujoiner, 1997
* Spirit & Opportunity, 2003
* Curiosity, 2011

In addition to enabling the camera to capture amazing pictures from the planet's surface, Materion optical components are involved in the monitoring of the planet as well. In fact, every NASA mission with an optical system (from the Mars Observer to the current MAVEN mission) has some type of Materion optic on-board. Recently, Materion has teamed with the Indian Space Research Organization (ISRO) to provide optics on-board India's inaugural mission (the Mars Orbiter) that is scheduled for this September 2014 arrival in Martian orbit.

Beyond the broad range of optical components from Materion Precision Optics, many of the lightweight materials necessary for space exploration are supplied by Materion Beryllium & Composites. This Includes the beryllium used for reflectors as well as the aluminum beryllium composite AlBeMet. Read more about our involvement with NASA space missions...

Characterizing the Performance of Optical Interference Filters with Deliberate Large Variation in Spectral Response

Some thoughts on the measurement of linear variable filters...

In This Issue

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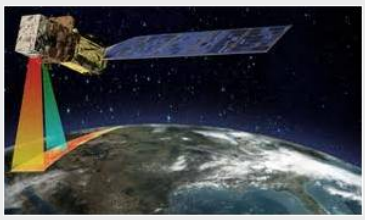
In the News! Space, Science & Astronomy

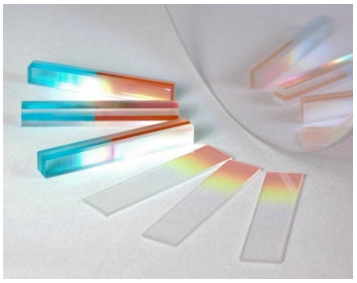
Landsat 8 Pinpoints Coldest Spots on Earth!



Landsat 8 - the Operational Land Imager (OLI) Photo Credit: NASA

We may think that it has been pretty cold in the USA over the past month, but Landsat 8 and MODIS have found a spot in Antarctica believed to be the coldest place on Earth - with a temperature below -133.6 Fahrenheit (-92 degrees C).

From time to time people are interested in optical filters whose response changes with position. Frequently the desire is for a filter that changes in one direction and remains constant in the perpendicular direction. The deliberate nonuniformity and anisotropy of these filters adds significant complications in the characterization of their spectral performance.



In the spectral measurement of real devices the size of area illuminated on the filter produces a measurement of the beam irradiance weighted average performance. In most commercial spectrophotometers this is an image of the entrance slit of the monochrometer and is typically around 2x7 mm. For optical interference filters, changes in the thickness and refractive index across the part result in changes in the spectral performance or in the uniformity. Among other things, the ability to control the uniformity determines the size of a filter that can be manufactured to a given tolerance. The narrower the filter, the tighter the control must be to fabricate a filter of the same size.

In Linear Variable Filters (LVF) our goal is to still control the thickness and index variation, but instead of targeting a constant value, we are after one that changes in a predetermined, usually linear, manner. We call this target the "filter dispersion" (FD) in order to offer the greatest likelihood of confusion with the material dispersion (MD) with which it is intrinsically linked. The full technical paper can be found as a PDF under Optical Interference Filters..

New Polarized Dichroic Filter for Projection

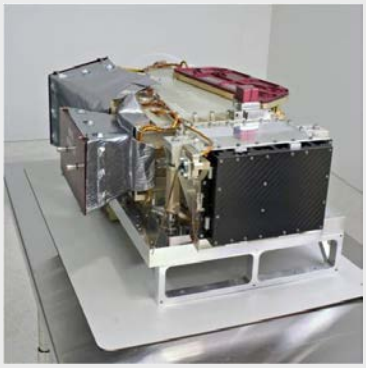
Technology Targets High Power Laser & Hybrid Projectors

.Materion has developed a new polarized dichroic filter that improves brightness performance and creates a compact light path design in laser projectors. The polarized dichroic filters consist of an optimized coating design that focuses blue laser light sources and has very steep cut-on and cut-off slopes. The design is perfect for splitting the light of blue channel from that of green and red channels, thus achieving excellent transmittance. It accomplishes this while minimizing the wavelength shift and transmittance decay at multiple angles.

The challenge for this filter, especially for blue channel transmittance, is to minimize the shift of the spectrum and transmittance decay at a big light cone, typically covering 45+/- 5 degree angle-of-incidence. Materion's filter coating spectrum and its actual performance can satisfy the wide angle cone requirements. It can also enhance the blue channel performance by maximizing the utilization of the blue light source. This provides the system designer a solution for both efficient optical performance and compact structure. Materion produces multiple interference filters that increase high spectral performance. Read more about our Dichroic Filters..

Prior measurements were hampered by lower resolution and measurement accuracy. The combined measurement data from these two satellites - both carrying Materion filter arrays - has enabled this new discovery. More photos at...

Satellite to Orbit Mars with Materion Filters Aboard



Imaging Ultraviolet Spectrograph - measures global characteristics of the upper atmosphere.
Photo Credit: NASA

Materion' s involvement in space instrumentation continues as the Mars Atmosphere and Volatile Evolution mission (Maven) to Mars was launched in November and is now in a cruise phase. Arrival at Mars will occur in September 2014. The satellite will orbit Mars and explore its upper atmosphere to gain insight regarding the presence of liquid surface water in Mars' early history. Materion produced the filters for the Imaging Ultraviolet Spectrograph

Read more about Materion space based imaging.....

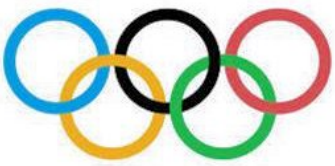
"Thin is In!"
Low Temperature Sputtered Coatings for Plastics

It is widely known that traditional magnetron sputtering thin film deposition lends itself to elevated temperatures. This high temperature environment is not ideal for non-optical applications where a thin film coating is required on soft moldable substrates such as polyamides, ABS and other forms of plastic. Materion Precision Optics has developed low temperature sputtering metallization capabilities that can be applied to most moldable synthetic and semi-synthetic plastics. This technique has been used to enable a number of applications such as conductive flexible membranes, impedance matched layers in acoustic stacks, and reflective / anti-reflective packages for optical focal planes and detectors.

Monitoring Substrate Temperature
Not all plastics are equal and the material characteristics are important when preparing the coating process. It is important to understand the softening point, melting point, etc. to ensure that there is no damage to the substrate during thin film deposition. Monitoring the substrate temperature is critical. Typical methods used are: optical pyrometers, thermocouples, or something as simple as a thermometer inside the chamber visible to the operator. Depending on the part and its rotation, it can sometimes be very difficult to monitor the temperature and installing an optical pyrometer through a port window may be necessary.

Cool Down Processes
Monitoring the temperature is only one part of the process. Even though you verify the temperature in the chamber, sometimes an undesirable increase is unavoidable. To help control the temperature during deposition multiple between-layer cool downs may be required. The number of pauses is going to be dependent on the coating thickness. Materion Precision Optics has successfully used temperature-monitoring, cool down phases during deposition along with other proprietary processes. This ensures that the plastic substrate material is not damaged during thin film deposition. Read more about low temperature sputtering ability for plastics...

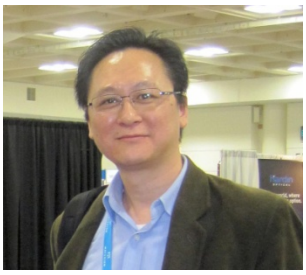
Olympic Materion Connection
Pairs Figure Skating for Team USA



As the Olympics open on February 7, Materion will be cheering on athletes from around the world as they compete in Sochi, Russia. We will be paying particular attention to the Pairs Figure Skating as one of our own seeks the gold. Simon Shnapir, son of Materion Precision Optics Sr. Application Design Engineer Boris Shnapir, along with his skating partner Marissa Castelli, will take a spot on the U.S. Olympic Team. His Dad is justifiably proud of Simon's accomplishment.

Recently Simon, 26, from Sudburgy, MA and Marissa, 23, from Cranston, RI, took home their second straight pairs title at the U.S .Figure Skating Championships in

Meet Materio: Simon Cao



Born in Shanghai, Dr. Simon Cao spent 16 years living in Scandinavia before returning to China in 2004. He now brings his extensive background to Materion Precision Optics where he is Head of Engineering and R&D (in Shanghai). As such, he is responsible for the Process Engineering, Design, R&D, and IP Management in Shanghai Operations and reports directly to Wren Zhu, Managing Director of the Shanghai facility. Since first coming to Materion in 2010, Simon has focused on product innovation and diversification to enable entry into new optics market segments. As the Shanghai facility transitions from being just an OEM supplier to being a key partner with customers, Simon and his colleagues are working toward developing turnkey solutions. Read more about Simon...

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DEFENSE, SECURITY & SENSING CONFERENCE hosts the industry's most

Boston. "We're on to Sochi," said an excited Shnapir in a recent interview. "I know it's a cliché, but this is a dream come true. We've worked so hard for eight years and this is a great pinnacle for us."

After winning their U.S. title last year, Shnapir and Castelli placed 13th at the World Championships. The last Olympics medal for the USA in figure skating pairs was a bronze in 1988 in Calgary, Canada. The Materion family wishes the duo the best of luck and an enjoyable competition for all the athletes.

important scientific conferences on optics, IR imaging, lasers, and sensing for defense, security, industry, healthcare, and the environment.

See you there!

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