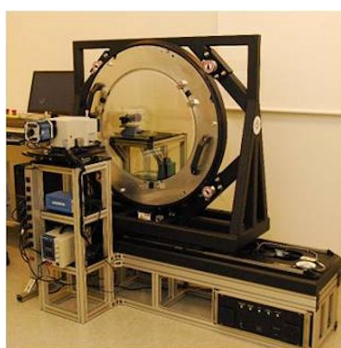


Large Area Optics Lab Fully Operational

Astronomy Projects Undertaken in Five Countries



Materion large spectrophotometer with Subaru HSC filter.

Our Large Area Optics (LAO) laboratory is now complete and fully operational. The large spectrophotometer was installed in August and joins the coating machine and the substrate cleaning system in a purpose-built ISO 6/7 clean room. The spectrophotometer can take spectral (wavelength) data at any point on a 750 mm diameter substrate and at any spatial interval while under full automatic computer control. It was custom designed and built to Materion performance specifications, as were the other pieces of equipment comprising the Lab.

The Large Optics project has enjoyed impressive results. We achieved immediate success in coating large narrow bandpass filters for the Hyper Suprime Camera (HSC) for the Subaru telescope on Mauna Kea.

Recent Large Area Optics Lab Projects

Subaru Filters for HSC - The Deposition System was powered up in early 2013. We began coating the first of four 600 mm diameter Subaru filters in January and completed them in mid-August. We immediately achieved impressive results with great consistency. We created two compliant NB 515 filters before moving on to the remaining filters. Each subsequent band was successfully coated on the first attempt. High yield is extremely important since the substrates are provided by the customer and are extremely expensive. [Read more about the LAO laboratory...](#)

Dust-Free Solution for Image Projection

Materion Develops Hall Sensor Color Wheel

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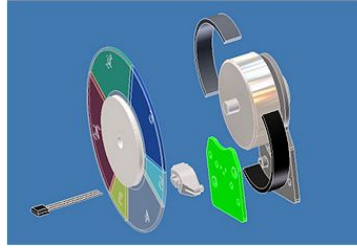
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IN THE NEWS!
**Space, Science &
 Astronomy**

Solstice Mission Carries Materion Filters



Materion is developing a new color wheel that offers a solution to improved image projection in dusty environments. In areas where air quality may be poor, such as developing countries or busy cities, projector operation can be affected by dust particles. Our new color wheel, with its innovative hall sensor motor, is able to overcome this problem and offer a cost advantage.



The Challenge

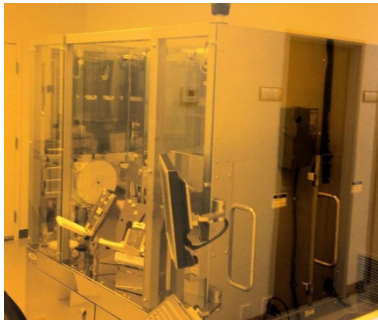
The current system uses a photo sensor to read the TIM (time index mark) to recognize the color filter segment position. However, if any particles or dust appear on the photo sensor, it will not work properly and cannot create a signal (the waveform) to the controlling IC on the DLP projector board. This failure would cause the color wheel to stop and not be initialed.

The Materion Solution

Our solution is to provide a component for the color wheel that can create the signal with a hall sensor. With this in place, the projector will not be sensitive to particles or dust. By replacing the photo sensor and time index mark with a hall sensor, it allows the digital micro mirror device (DMD) IC to recognize the position of each color filter segment or phosphor segment. [Read more about the Hall Sensor Color Wheel...](#)

State of the Art Patterning

Custom 3D Tool Maximizes Capability



Materion has made significant investments over the last year to increase our optical coating capability of wafers in order to support the growing trend in wafer level packaging of thermal imaging devices. In addition to a new 3000 square foot, class 1000 clean room space, Materion has also installed several state-of-the-art wafer processing tools that greatly increase our pattern generation capabilities. In addition

to wafers for thermal imaging, these new tools offer great possibilities for other customer applications as well.

Custom 3D Patterning Tool

Our new custom 3D patterning tool is a fully automated, recipe-driven machine that uses robotics to spray coat 150mm to 200mm wafers. The machine can process cassettes of twenty five wafers at a time with an operator only required to load the cassette and start the recipe. This level of automation will help to ensure the maximum level of photo-resist coating uniformity across topographies with a depth of hundreds of microns.

Advantages of the New Tool

Image of Saturn. Photo Credit: European Space Agency (ESA)

This recent (June 2013) image of Saturn was taken through Materion filters manufactured in 1993. The image captures a huge storm on Saturn's surface. The Cassini spacecraft that hosts the filters was launched in 1997 and is still in operation.

Details can be found at <http://saturn.jpl.nasa.gov/>

Hubble Telescope Camera Contains Materion Filters



Image of "cosmic caterpillar." Photo Credit: European Space Agency

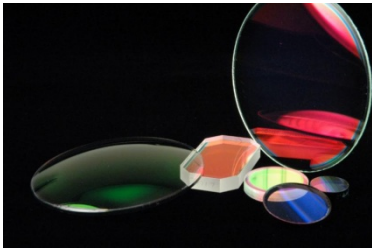
This is the image of a "cosmic caterpillar" as viewed through Materion filters in the Advanced Camera for Surveys (ACS) instrument aboard the Hubble Space Telescope. We manufactured the ACS filters - 18 discrete filters and 15 ramp segments altogether in the 1997/98 time frame while the ACS was installed on Hubble in March 2002.

Photo Detail: Harsh winds from extremely bright stars located 15 light-years away from the knot towards the right edge of the image, are

The tool is specifically designed to provide resist deposition that can be used in Materion's vacuum chambers at various high temperature coating processes. The patterning tool also has multiple automated heating and cooling plates, automated alignment to notches and flats, and capabilities that decrease patterning time per wafer. These combined factors will increase throughput, reduce human error and decrease cost. [Read more about our patterning capabilities...](#)

Rugged Rugate Filters

Fabricated in a Wide Range of Materials



Rugate offers an extremely versatile technique for the construction of optical rejection filters. They are particularly well suited to optical applications in which narrow bands of light are to be removed from a broad spectral band.

Materion's Role in Rugate Technology

Rugate Filter Technology was developed several years ago at Materion's Westford, MA location through a series of US Air Force development programs. These programs allowed us to create a robust cost-effective means for producing filters with deep rejection bands but very wide windows of transmission. This valuable capability can be readily employed in multiple applications for which narrow spectral bands are redirected from a broad spectral range.

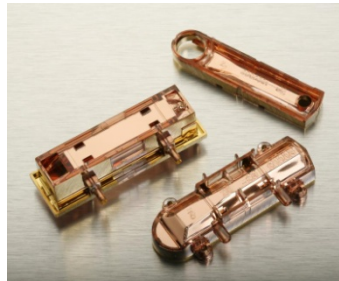
Fabrication of Rugate Filters

Materion fabricates Rugates from a wide range of materials depending on the spectral requirements of the filter. The vast majority are manufactured with refractory metal oxides for use in the visible and short wave infrared. Rugates are fabricated by combining two or more materials to form a continuously varying composition as a single layer solution. [Read more about our rugate filters...](#)

Engineered Thin Films

Solutions for Demanding Applications

Materion engineered thin films (ETF) enable innovative and new technologies by providing nearly limitless material coating options. Whatever your application, we develop and supply thin film solutions for the aerospace, microelectronics, scientific, thermal imaging and biomedical industry.



ETF coatings are not easily defined as they are a means to solving a customer's challenging requirement. Coatings

blasting ultraviolet radiation at this "wannabe" star and sculpting the gas and dust into its long shape.

The caterpillar-shaped knot, called IRAS 20324+4057, is a protostar in a very early evolutionary stage. It is still in the process of collecting material from an envelope of gas surrounding it. The object lies 4500 light-years away in the constellation of Cygnus (The Swan).

Meet Materion: Patrick Flaherty



Meet Pat Flaherty, currently Design Engineering Manager for the Westford facility, as well as Prototype Value Stream Manager, reporting to Ian Tribick, VP/COO/CTO of Materion's Thin Film Coatings Group. In his almost twenty years at Materion, (including time at Barr Associates which was acquired by Materion in 2009), he has held many positions. These include Application Engineer, Product Team Leader, Coating Design Development Engineer, Account Manager, and Senior Staff Engineer.

Related to the advantages of

can be metallic or inorganic, and their physical characteristics can be tailored to exact performance specifications such as conductivity, corrosion resistance or radiation reflectance. The coated substrates may be metallic, ceramic or polymeric and their surfaces may be planar or 3-dimensional.

Following are a few examples of how Materion engineered thin film coatings resolve customer issues:

The customer needs a uniform thin film coating on a non-planar non-symmetrical part. Our engineers work closely with our CAD team and machine shop to modify a coating chamber and build specialized tooling that can properly rotate the part during the coating process. This ensures that the coating will meet the customer's requirements. Typical substrate materials include: plastics, composites and various metal types. Typical coatings include emissive coating for aerospace or EMI/RFI coatings also coatings that may meet a customer's resistance requirements. [Read more about engineered thin films...](#)

the acquisition, Pat commented that "it provided significant resources that led to investing in technologies/capabilities not available to us in the past. In turn, it has allowed us to solidify our position as a technology leader and build lasting relationships with important customers in key markets." [Read more...](#)

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