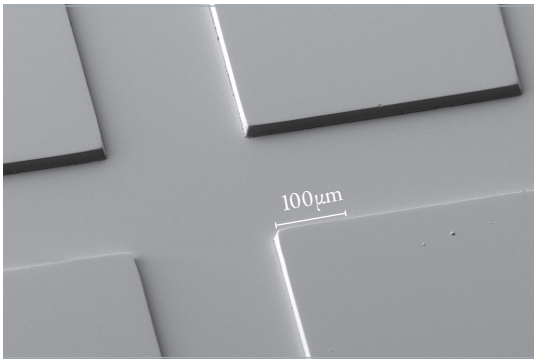
MATERION
// BALZERS OPTICS

Micro-Patterned High-Performance Optical Filters

Patterned PARMS filters for most challenging spectral characteristics

Many applications, ranging from space-born hyperspectral cameras to color sensors and automated sorting systems employ patterned dielectric filters. The more sophisticated these applications, the higher the need for complex optical filters with steep spectral edges and deep, broadband blocking. However, such demanding filters often call for high-end coating technologies and an increased overall film thickness, meaning that they can't be patterned straight forward via conventional photolithographic processes. Materion Balzers Optics recently developed a novel process, now allowing for a patterning of high-performance filter stacks made by plasma-assisted reactive magnetron sputtering. This now allows applications to benefit from an improved performance.



Benefits

- Patterned high-thickness filter stacks
- Extremely steep physical edges of the patterns
- Flexible, high-performance spectral characteristics
- Extreme environmental stability (heat, humidity, radiation) by using PARMS

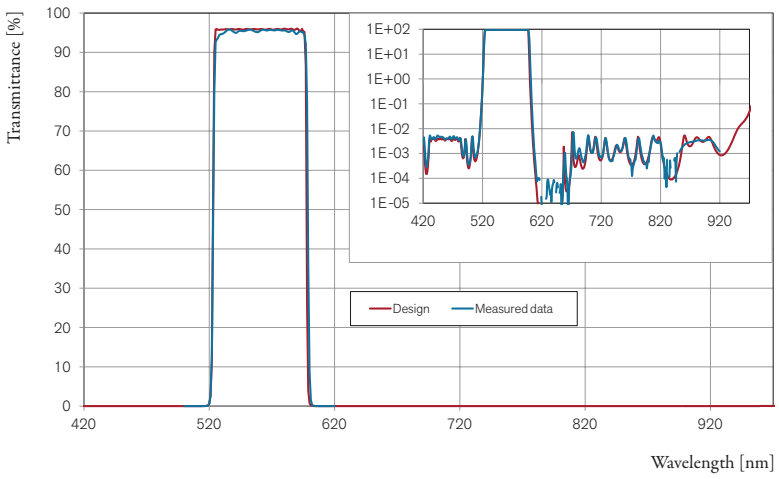
Applications

- Multi-spectral Imaging
- Multi-color optical sensors
- Order sorting filter arrays
- Raman Spectroscopy

Technical Data

Wavelength range
250 – 2000 nm
Passband transmittance
> 90 %
Blocking
OD5 broadband
Maximum filter dimension
200 mm
Minimum filter dimension
50 µm
Physical edge steepness
< 5 µm
Position accuracy
< 3 µm
Surface Imperfections
< 100 µm
Temperature range
- 50 ... 150 °C
Humidity range
0 – 99 %

Steep Edge Filters with broadband OD4 blocking for demanding applications



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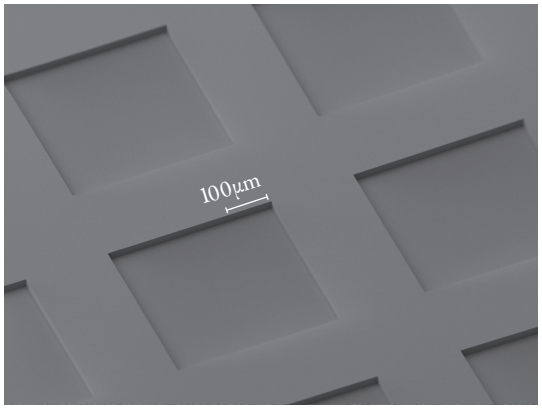

Fig. 1: Scanning electron microscopy (SEM) image of resist pattern before the PARMS deposition process.

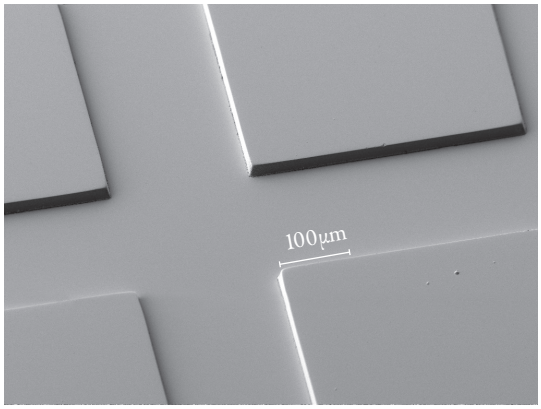

Fig. 2: SEM image of the patterned PARMS filter after the remaining photoresist was lifted.

Fig. 3: Using a focused ion beam technique a cross-section at the physical edge of the filter stack was prepared. Note that the edge width is approximately 3µm for an overall filter thickness of 15µm.

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