

Dedicated



## FILTER CUBES

Chroma Technology is a leading manufacturer of interference filters for the ultra-violet, visible and near-infrared portions of the spectrum. Established as an employee-owned company in 1991, Chroma has specialized in the design and manufacture of precision optical filters and coatings in the United States for more than 20 years.

### How flat is your world?

If you're imaging in TIRF mode, the answer should be "very flat." Even very slight curvature or flexing of the surface of a dichroic used to reflect a TIRF laser results in astigmatism. This distorts the reflected laser beam — and that results in a less-than-optimal evanescent wave for your imaging. This distortion also results in laser photons propagating into your sample, producing spurious fluorescence beyond the TIRF zone.



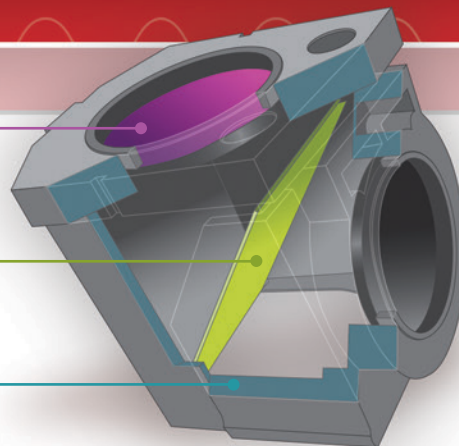
#### Spurious fluorescence from beads above the TIRF zone.

Images acquired in TIRF mode with 561 nm laser and 60x TIRF objective using a laser filter set with a standard 1mm dichroic mounted in a standard microscope manufacturer's filter cube. Z-projection (SUM) image of a stack of 39 100nm optical sections far above the TIRF zone (2.1 - 6.0µm above coverslip). Sample consisted of 200nm TetraSpeck Microspheres™ on coverglass and also suspended in agarose.



#### What you should see above the TIRF zone: Nothing.

Images acquired using a Chroma dedicated TIRF filter set with 2mm UltraFlat™ dichroic mounted in a metal TIRF filter cube. Same sample, identical imaging, processing and display conditions as above. Notice that none of these beads are excited in TIRF mode. If TIRF is properly achieved, excitation is strictly limited to the evanescent wave region, <200nm above the glass/media interface.



### Chroma's solution: make it flat.

Our complete, sputtered TIRF filter sets mounted into our patented metal TIRF cubes provide three unique advantages to optimize your TIRF data:

- **Create optimal evanescent waves** with Chroma's UltraFlat™ dichroics. Our TIRF dichroics have a final, finished surface flatness deviation of less than one half of a wavelength of light/inch surface. This allows for distortion-free reflection of your TIRF lasers, converting more energy into an effective evanescent wave and sending fewer laser photons into your sample.
- **Keep your world flat.** Chroma's patented metal filter cubes\* hold the flattest dichroics and keep them flat. Other cubes use mechanical means to hold the dichroic, flexing them out of flatness. Plastic cubes can be torqued, further warping a dichroic and distorting your reflected TIRF laser beam.
- **Maximize the signal/noise ratios of your images** with emission filters that provide higher optical density. Our TIRF emission filter combinations result in images with the largest S/N ratios because of the increased attenuation of TIRF lasers.

\*Available for most current microscope models

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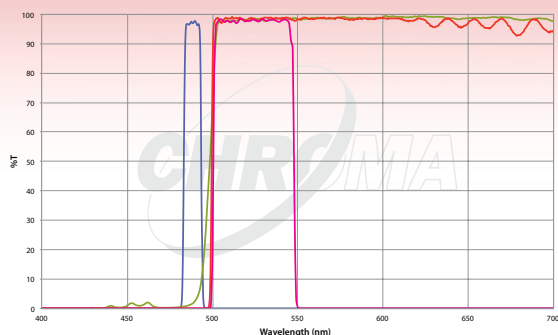
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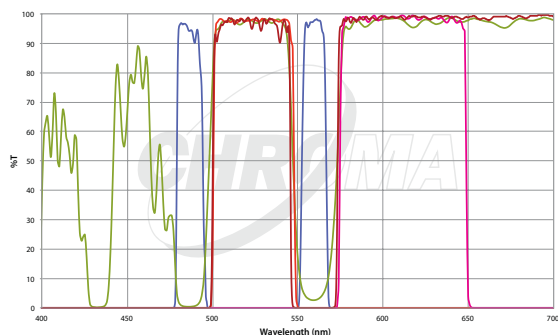
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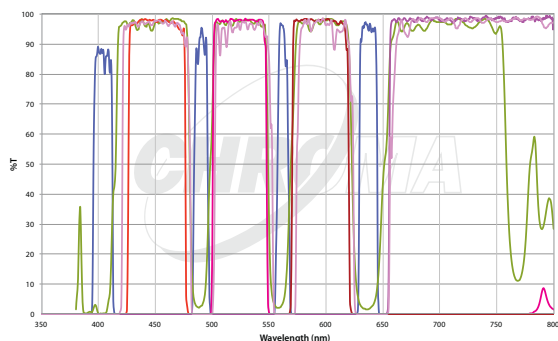
### Sputter-coated Laser Filter Sets Optimized for TIRF and Mounted in Chroma's Custom Metal Filter Cubes



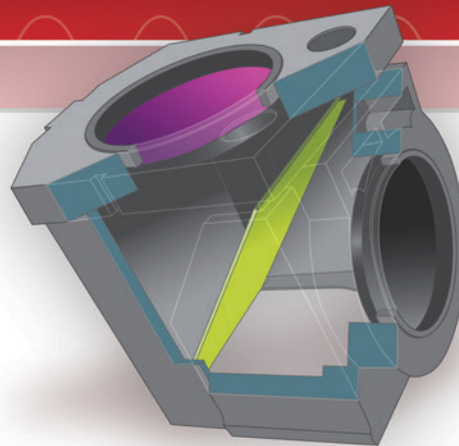
Single-band TIRF filter set with additional emission filter for exceptional blocking and ultra-high S/N ratio



Dual-band TIRF filter set with additional emission filters for exceptional blocking and ultra-high S/N ratio



Quad-band TIRF filter set with additional emission filters for exceptional blocking and ultra-high S/N ratio



## Why consider a **Chroma TIRF** filter cube from Chroma?

### ► Thicker, UltraFlat™ dichroics for distortion-free reflection of lasers

Surface curvature causes convergence or divergence of reflected light waves, resulting in reflected wavefront distortion (RWD). Chroma's UltraFlat laser dichroics are produced by a proprietary manufacturing method using thicker substrates, allowing us to control and specify levels of dichroic surface flatness according to thickness. For more demanding laser applications, Chroma's thicker, UltraFlat dichroics can provide much better results.

### ► No-torque metal cubes and stress-free mounting of dichroics

Any mechanical means of holding a dichroic will introduce some degree of pinching or twisting, which warps the surface of the dichroic. This will distort the reflected laser beam profile, creating problems for applications requiring critically flat reflective surfaces. Chroma's own brand of torque-free, metal microscope cubes enables stress-free mounting to provide distortion-free reflection of lasers, giving you the ability to create the perfect evanescent wave.

### ► Additional emission filters for exceptional blocking and ultra-high S/N ratios

Because TIRF imaging results in the "Total Internal Reflection" of the excitation laser beam, emission filters are challenged with attenuating an enormous amount of illumination returning through a microscope objective lens. Chroma's complete TIRF sets remove the guesswork and allow you to obtain the highest possible signal/noise ratios by blocking the laser illumination at exceedingly high levels.

Visit [www.chroma.com/tirf](http://www.chroma.com/tirf) to view our TIRF filter sets

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