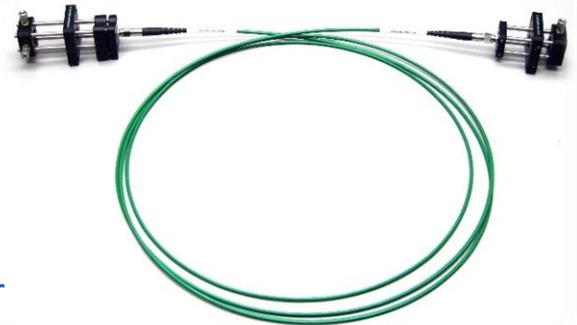




## Mid-Infrared Optical Assemblies



Hollow core fiber



Off-the-shelf and custom optical assemblies are available for use with Mid-IR hollow core fibers, including optimized solutions for coupling, collimation, and/or focusing.

### Focal Length and Coupling

In general, coupling light into hollow core fibers is relatively simple, given the relatively large core. However, both transmission and beam quality can be adversely affected if the proper focal length optic is not used. In general, the beam should enter straight into the fiber with a relatively gradual focus. Optimal coupling into the lowest order mode occurs when the ratio of the focused spot size to the fiber ID is  $2\omega_o / (ID) = 0.64$ .

This is in terms of the focused beam waist ( $1/e^2$  radius):

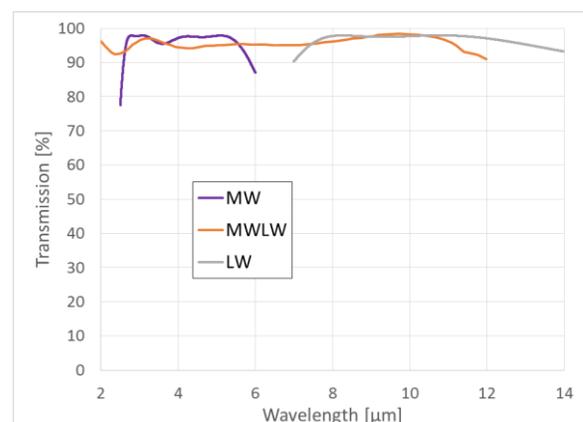
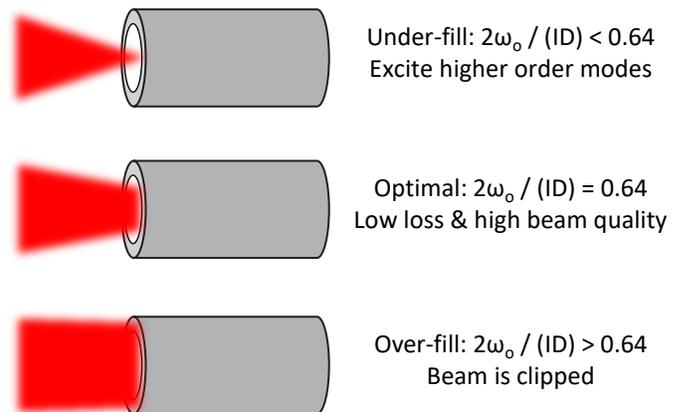
$$\omega_o = \frac{2\lambda}{\pi} \left( \frac{f}{D} \right)$$

← Lens focal length  
← Laser beam diameter

$$\text{Optimal focus: } f_{opt} = 0.16\pi(ID) \left( \frac{D}{\lambda} \right)$$

### AR Coating / Lens Transmission

Guiding generally uses lens materials and AR coatings that are optimized for three different wavelength ranges as shown in the plot to the right. Note: these ranges are related to, but not identical to the designation of the hollow fiber dielectric coatings.





## Mid-Infrared Optical Assemblies

### Connector Options

Optical assemblies are available with mating connectors for either SMA or FC terminated fiber cables.

### Mounting Options

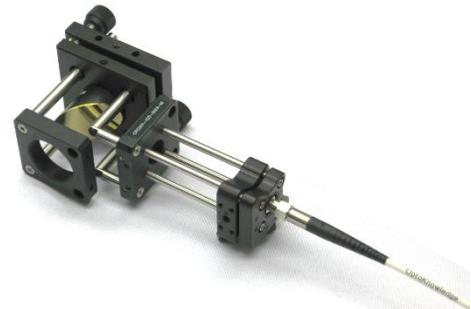
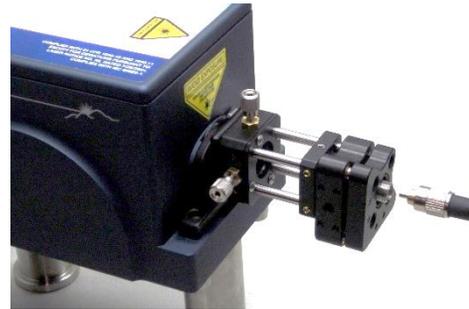
Coupling optics can be mounted to an optical bench (i.e., free-space) or directly to a Daylight Solutions laser head. Free-space (FS) versions are available with either metric (M4) or imperial (#8-32) threads for mounting to a post. Custom mounts are available for the following Daylight Solutions Lasers: CW/Pulsed, Unicorn, Uber-Tuner, Mode-hop-free, and Hedgehog. Direct mounting is also available for MIRcat lasers, but requires modification to the laser housing.

### OAP Assemblies

For ultra-broadband applications, as well as those in which back reflections from an AR coated lens are a concern, we offer optical assemblies that utilize off-axis-parabolic (OAP) mirrors instead of lenses. Note: OAP assemblies are more difficult to align than lens assemblies. If an OAP is required, please inquire about available options.

### Collimation/Focusing Assemblies

Guiding can design custom optics that are optimized for the low-divergence output beam exiting a hollow fiber. This includes simple single lens designs for collimation, as well as, complex high-NA, multi-element designs for focusing to a diffraction limited spot.



### Contact Us

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We are a spin-off from Opto-Knowledge Systems, Inc. 