PIR-fibers

The development of specialty fibers for the Mid-Infrared region has resulted in a unique product - Core / Clad Polycrystalline Infra-Red (PIR-) fibers. The PIR fibers are non-toxic, very flexible, transparent across a broad spectral region 4 - 18 µm and capable of operating over the wide temperature range of 200°C up to +250°C. They are manufactured in a core/clad structure of superior quality from pure AgCl: AgBr solid solution crystals using an innovative vacuum extrusion method. They possess by no aging effect compared to an alternative bare core fiber. The range of PIR-fiber cables are available with a durable PEEK polymer jacket and terminations using either an SMA - type connector with a Ti or polymer ferrule or special one, manufactured on customer request. A wide variety of different optical coupling units can also be designed & fabricated for specialized customer requirements.

FEATURES

High transmittance from 4 µm up to 18µm. Suitable for CO₂ - laser power delivery up to 50 W. Low Attenuation at 10.6µm (0.1-0.5 dB/m). Fiber diameters from 0.3 to 1.0 mm (on request). Fiber lengths up to 20 m (for 0.5 mm diameter). No aging effect.

FIBER DESIGN AND PROPERTIES

FIBER SPECIFICATIONS (standard)

<table>
<thead>
<tr>
<th>Fiber diameter</th>
<th>Transmission range</th>
<th>Attenuation at 10.6 µm</th>
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<tbody>
<tr>
<td>400/500</td>
<td>4-18 µm</td>
<td>0.1-0.5 Db/m</td>
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<tr>
<td>630/700</td>
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<tr>
<td>900/1000</td>
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Refractive index 2.15
Effective NA 0.25
Laser Damage Threshold for cw CO₂-laser >12 kW/cm²
Melting point 415°C
tensile strength >100 MPa
Minimum Bending Radius (fixed) 10x[Fiber Diameter]
Minimum Elastic Bending Radius 100x[Fiber Diameter]

Standard fiber/cable diameters
Other fiber diameters in 0.3 - 1.5mm range are also available upon the request for special fabrication.

Product code Core [µm] Clad [µm] Jacket's inner diameter [µm] Jacket's outer diameter [µm]
PIR 400/500 400 500 740 1590
PIR 630/700 630 700 1400 3175
PIR 900/1000 900 1000 1400 3175

Cable termination with a special Ti-ferrule SMA-connector: for low power (spectroscopy & radiometry) applications for high laser power delivery - free standing fiber end

standard cable length - 1m & 2m
PIR-fiber end-surface treatment Cutting low cost, high performance - standard Polishing for special application, including AR-coating - on request
SMART for reduced reflection of high CO₂-laser intensity - on request
OPTIONS accessory kits for remote spectroscopy with FTIR, QCL and TDL-spectrometers pig-tailing of IR-detectors: TE- & LN-cooled MCT, PbSe, thermopiles, etc.

APPLICATIONS

• Flexible delivery system for CO and CO₂ laser.
• Flexible IR-imaging systems.
• Remote non-contact pyrometry in the 100-600K range.
• Fiber probes for remote in-line, in-vivo and process IR - spectroscopy.