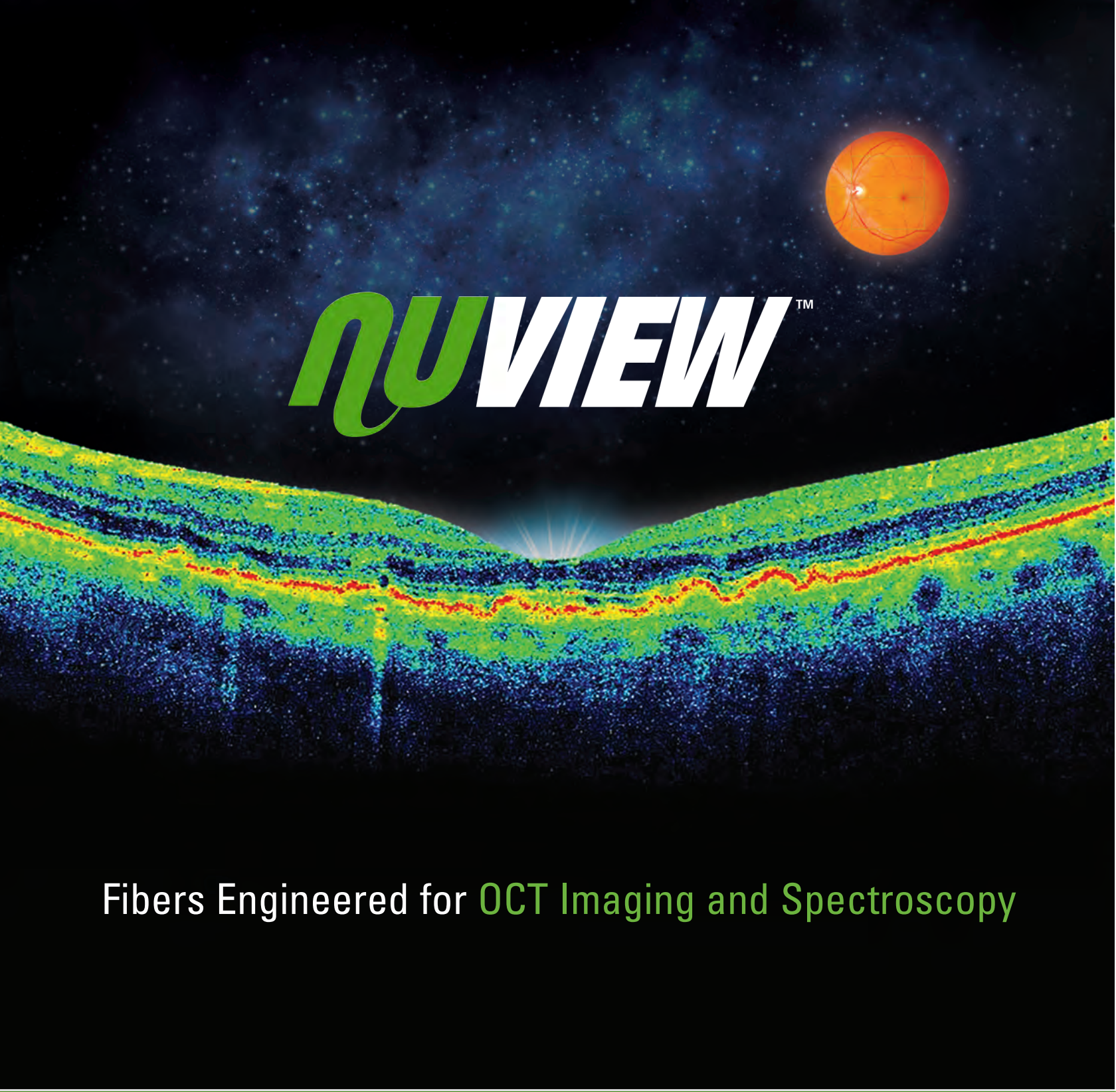

Fibers Engineered for OCT Imaging and Spectroscopy

Sharpen Your Image

Nufern expands its broad range of interferometry fibers with the introduction of the NuVIEW family of fibers for OCT imaging and spectroscopy. These fibers are designed to exceed the demanding requirements of todays advanced imaging systems and meet those of tomorrow by offering tighter tolerance specifications, wide operating wavelength ranges and excellent small signal performance. NuVIEW fibers offer significant benefits for both the science and manufacturability of next generation instruments. NuVIEW fibers from Nufern have landed on Mars, are part of the US strategic defense program, provide key technology to enhance image capture and resolution in OCT systems and are now entering in vivo medical applications.

NUFERN®

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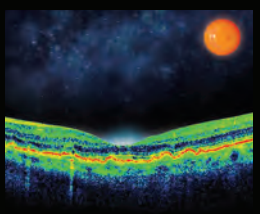
OPTICAL FIBERS – FIBER GYRO COILS – DIRECTED ENERGY – FIBER LASERS & AMPLIFIERS

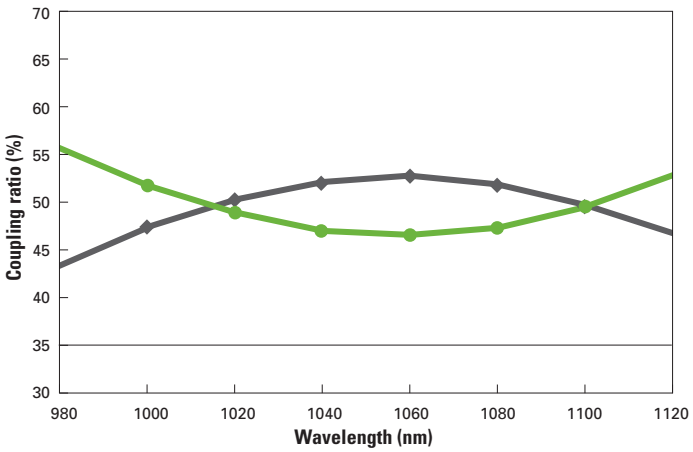
NUVIEW™

Fibers Engineered for OCT Imaging and Spectroscopy



Optical Attributes

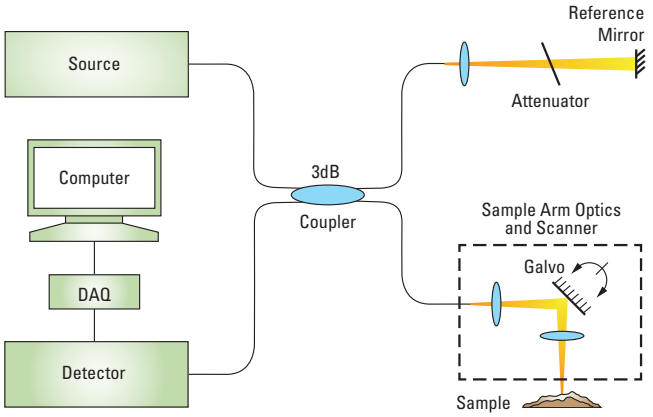
- Precise dispersion control - For sharp image resolution
- Very low loss - For highest signal to noise ratio
- High bandwidth - For greatest spectral accuracy
- Broad wavelength range - For greatest breadth of applications



Typical fiber coupler used in OCT systems requires broadband response in the wavelength of interest (courtesy Gooch and Housego).

Mechanical Attributes

- Very precise Core/Clad concentricity - Lowest splice induced artifact generation
- Tight clad diameter tolerance - Easiest splice-ability
- High prooftest - For longest application life
- Multiple coating choices - For broadest environmental suitability

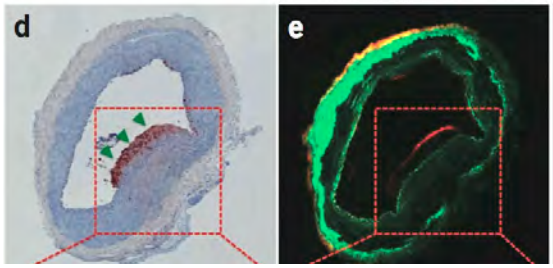


Schematic of a generalized OCT system. One of many modern interferometry based precision sensing systems.

Typical Applications

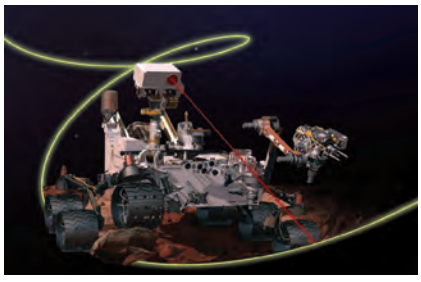
OCT Imaging

Spectacular arterial diagnostic images obtained by Harvard University Wellman Center.

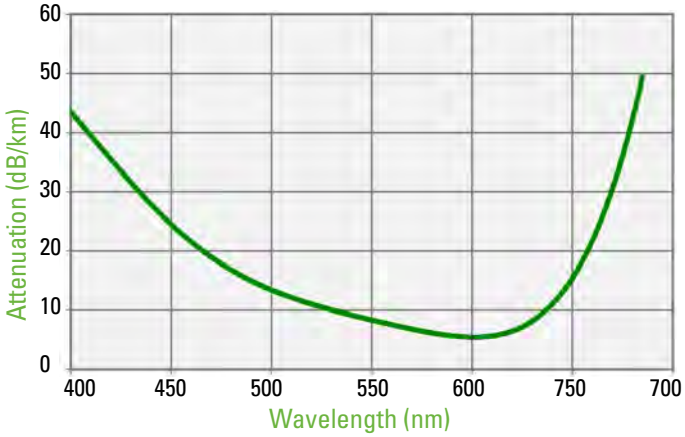


Spectroscopy

Spectroscopy fibers feed signals from the sensor on the arm to the analyzer in the body of Curiosity rover on Mars



PM-S405-XP Typical Spectral Attenuation over Operating Wavelength Range



Nufern offers a suite of select cutoff SM and PM fibers that cover the 350 to 850 nm wavelength range ideally suited for spectroscopic applications. Nufern's PM-S405-XP fiber covers the RGB wavelength range offering low attenuation necessary for many medical spectroscopic applications.

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780 & 1060 nm Dispersion Controlled Select Cutoff Fibers

Nufern's -OCT select cutoff single-mode fibers are optimized for Optical Coherence Tomography (OCT) medical imaging methods. These application-specific fibers were developed for next generation OCT applications that operate at both 780 and 1060nm and require exceptional uniformity, tight dispersion and core/clad concentricity control. The fibers are ideally suited for couplers used in OCT. This fiber can still be used for traditional applications as well and is prooftested to 200kpsi for superior strength. These -OCT fibers are part of the NuVIEW™ family of fibers providing extra high performance specifications for increased component reliability, component performance and production yields reducing component manufacturing costs. The -P version has a polyimide coating reducing overall fiber diameter and increasing operating temperature to 300°C.

Typical Applications

- OCT medical imaging
- Components/couplers
- Pump diode pigtails
- Couplers (including WDM)
- Single clad Yb-fiber pigtails

Features & Benefits

- Extremely tight dispersion uniformity and control — Required for high performance OCT components
- Exceptional uniformity and core/clad concentricity — Low, consistent splice loss to device components
- Superior low loss — Improves overall system device SNR
- Higher proof test levels — Critical for long term reliability in tight bend applications
- OCT-P version with polyimide coating — Enables high temperature (300°C) operation

Optical Specifications	**780-OCT**	**1060-OCT**	**1060-OCT-P**
Operating Wavelength	720 – 980 nm	930 – 1550 nm	930 – 1550 nm
Core NA	0.130	0.140	0.140
Mode Field Diameter (Gaussian)	5.0 µm @ 850 nm (nominal) 4.9 µm @ 780 nm (nominal)	6.0 ± 0.3 µm @ 980 nm 6.4 ± 0.3 µm @ 1060 nm	6.0 ± 0.3 µm @ 980 nm 6.4 ± 0.3 µm @ 1060 nm
Dispersion	-106 ± 4 ps/nm-km @ 850 nm	-38 ± 1 ps/nm-km @ 1060 nm	-38 ± 1 ps/nm-km @ 1060 nm
Cutoff	680 ± 30 nm	890 ± 30 nm	890 ± 30 nm
Core Index Of Refraction	1.4586 ± 0.0004@ 850 nm	1.4565 ± 0.0004@ 1060 nm	1.4565 ± 0.0004@ 1060 nm
Core Attenuation	≤ 3.0 dB/km @ 850 nm ≤ 4.0 dB/km @ 780 nm	≤ 1.1 dB/km @ 1060 nm ≤ 1.8 dB/km @ 980 nm	≤ 2.0 dB/km @ 1060 nm ≤ 2.5 dB/km @ 980 nm
Geometrical & Mechanical Specifications			
Cladding Diameter	125.0 ± 0.5 µm	125.0 ± 0.5 µm	125.0 ± 0.5 µm
Core Diameter	4.4 µm	5.8 µm	5.8 µm
Coating Diameter	245.0 ± 10.0 µm	245.0 ± 10.0 µm	155.0 ± 5.0 µm
Coating Concentricity	< 2.5 µm	< 2.5 µm	< 2.5 µm
Core/Clad Offset	≤ 0.30 µm	≤ 0.30 µm	≤ 0.30 µm
Coating Material	UV Cured, Dual Acrylate	UV Cured, Dual Acrylate	Thermally-cured, Polyimide
Operating Temperature Range	-60 to 85 °C	-60 to 85 °C	-65 to 300 °C
Short Term Bend Radius	≥ 6 mm	≥ 6 mm	≥ 12 mm
Long Term Bend Radius	≥ 13 mm	≥ 13 mm	≥ 25 mm
Prooftest Level	≥ 200 kpsi (1.4 GN/m²)	≥ 200 kpsi (1.4 GN/m²)	≥ 100 kpsi (0.7 GN/m²)

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