

Innovative Thin Film Coating Products & Services

Lightwaves2020 is a leading provider of optical thin film filters and optical coating services. Equipped with state-of-the-art optical coating facilities, Lightwaves2020's optical coating department focuses on design and manufacture of high end optical thin film filters for various demanding applications, including telecom, biomedical, optical instrumentation, optical sensing, astronomy, aerospace and defense & military.



Lightwaves2020

Our mission is to provide fast and consistently high quality services to fully satisfy your needs.

Coating Facility Overview

Coating equipments

- 3 Leybold APS 1104 E-beam systems
- 3 Veeco Ion Tech SPECTOR dual ion-beam sputtering systems
- Advanced OMS system enabling accurate thickness control of atomic level
- Commonwealth Scientific Millatron ion-milling dry etching machine

Pre- & post-deposition process equipments

- Grinding machine
- Polishing machine
- Diamond saw dicing machine

Testing instruments

- Varian Cary 500 Scan UV-Vis-NIR spectrophotometer
- J.A. Woollam spectroscopic ellipsometer
- Veeco scanning probe atomic force microscope (AFM)
- Environmental durability test chambers



Spectroscopic ellipsometer for accurate thin film characterization



Scanning atomic force microscope (AFM) for surface metrology



Full line of Pre- & Post-process equipments

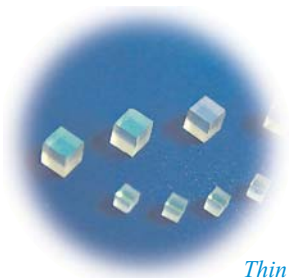
Optical Coating Features:

- High transmission
- High OD blocking
- Sharp slope
- Very dense film and extremely good environmental stability

Applications

- **Biomedical optical systems**
(fluorescence filters, raman filters and laser line filters, ...)
 - * Flow cytometry,
 - * Confocal microscopy
 - * Bio-imagers, bio-sensors, micro-plate readers / Analyzers
 - * Biomedical lasers
 - * Raman spectroscopy
- **Optical instrumentation:**
 - * Raman filters (BPF, LPF and 45deg dichroic)
 - * UV/Vis/NIR spectroscopy,
 - * Optical monitoring / sensing,
 - * Security optical systems
- **Lasers:**
 - * Laser line filters,
 - * High power laser mirrors, dichroic beam splitters,
 - * Linear variable neutral density filters

Applications



Thin film filters



Fiber tip & collimators coating



Color lens & mirrors

• Telecommunications

- * CWDM, 0 or 13.5deg AOI; standard or extended blocking
- * DWDM: 50G, 100G, 200G
- * X-skip-Y: 2skip0, 4skip1, 4skip0,...
- * GFF: customer specific
- * WDM mirrors, dichroic beam splitters
- * Grin lens coating; fiber tip coating
- * Tunable filters (either angle or position tuning)

• Information displays

- Optical coatings and filters for DLP and LCoS projection displays
- * X-Cubes, TIR prisms
- * PBS
- * Color filters
- * UV-IR cut filters
- * Mirrors

• Optical imaging

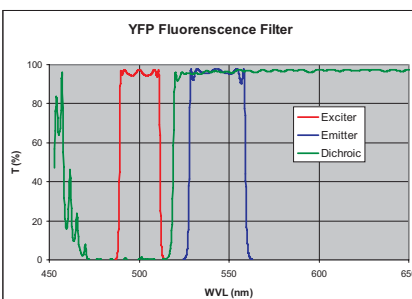
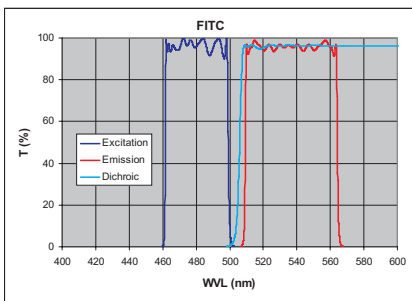
- CCD and CMOS imaging
- * IR cut filters
- * UV-IR cut filters
- * Color filters
- * Other custom wavelength selective pass or rejection filters

• Astronomy

- * H-Alpha filters
- * Nebula filters

• Other customer coating services

- * AR coating
- * Neutral density filters
- * ITO coating
- * Metallic coatings: Au, Ag, Al, Cr, ...



Sample Spectra

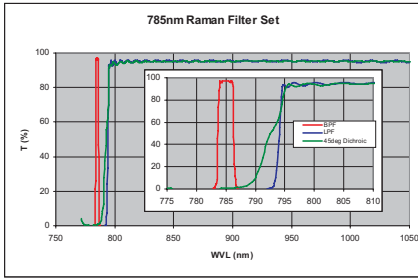
A. Fluorescence filters

- * Confocal microscopes
- * Bio-imagers, bio-sensors, microplate readers, analyzers
- * Flow cytometers
- * Biomedical lasers

Fluorophore	Exciter		Emitter		Dichroic
	CWL (nm)	BW (nm)	CWL (nm)	BW (nm)	Reflection (nm)
CFP	438	20	483	30	426 - 450
CY3	531	30	593	75	499 - 555
CY5	628	60	692	70	594 - 651
DAPI	377	50	447	50	344 - 404
FITC	482	30	536	40	446 - 500
GFP	472	40	520	50	442 - 488
Texas Red	562	40	624	60	530 - 585
TRITC	543	50	593	55	499 - 555
YFP	500	20	542	30	488 - 513

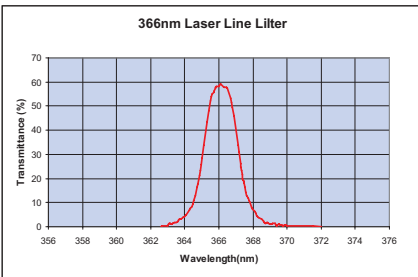
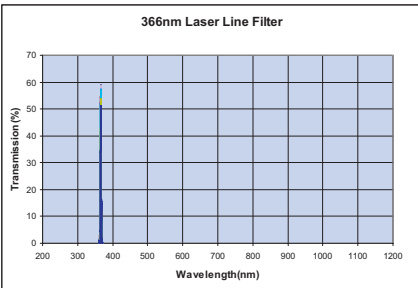
Sample Spectra

B. Raman filters



Available wavelengths for Raman filter sets (each set consists of one BPF, one LPF and one 45deg dichroic beam splitter)
 322, 355, 366, 405, 425, 473, 488, 491, 532, 633, 658, 785, 808, 830, 980, 1064

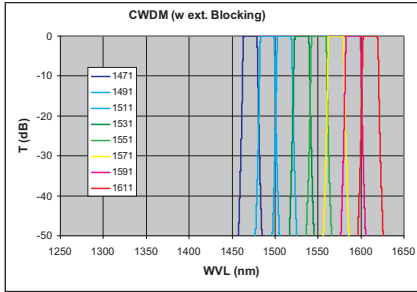
C. Laser line filters



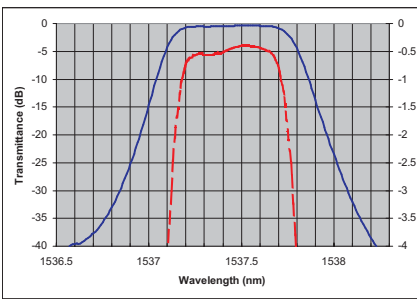
Available laser line filters:
 322, 355, 366, 375, 387, 405, 415, 425, 473, 488, 491, 532, 633, 658, 785, 808, 830, 850, 920, 980, 1064nm.

C. Telecom filters

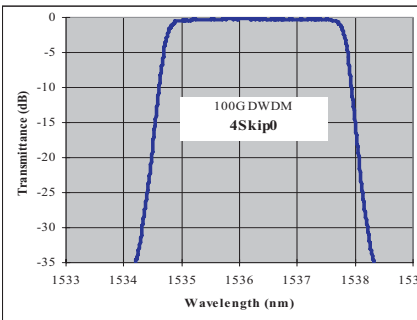
CWDM filters



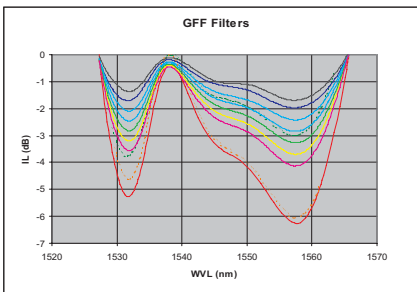
DWDM filters (100 GHz)



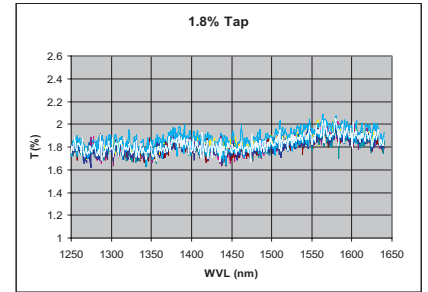
100 G 4skip0



GFF



Tap coating



Display filters

