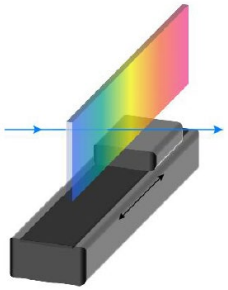
Comparison for tunable filters

Flexible Wavelength Selector (FWS) Comparison

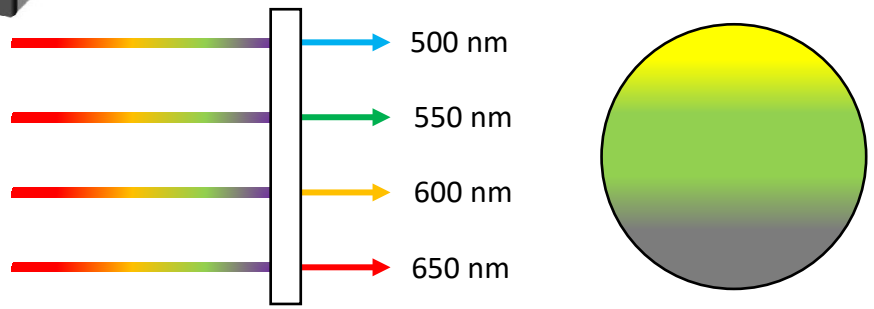
	Liquid Crystal	Acousto-Optic Tunable Filter(AOTF)	Grating	Laser Line Tunable Filter (LLTF)		Flexible Wavelength Selector (FWS)	
Laser Damage Threshold	low	high	high	high		high	**< 2 MW/㎠ (CW)**
Passband shape	poor	poor	poor	great		great	**Maintaining the input beam characteristics**
Out-of-band blocking	poor	poor	poor	good	OD 6	**great**	**OD 10 up to 1700 nm**
Wide tuning range	high	discontinuous	high	high		high	**255-1700 nm**
Adjustable bandwidth in real-time	x	x	x	x		**possible**	**2-15 nm (nominal)**
High Throughput	poor	poor	poor	good	~ 65%	**great**	**≥ 75 %**
Aperture size	Limited	Limited	Limited	Limited	< 5 mm	**Diverse (5, 10 mm)**	**Work with both Laser and lamp types**
Polarization	Dependent	Dependent	Dependent	Independent		Independent	**Unpolarized**
Distortion	Free	O	O	Free		Free	**No distortion**
Custom set wavelength	Fixed range	Fixed range	Fixed range	Fixed range		Free	**Select any wavelength from 255 – 1700nm**

LVBF and Flexible Wavelength Selector (FWS) Comparison

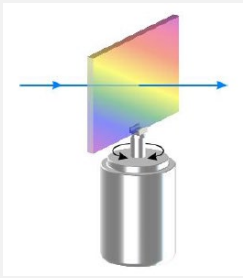


LVBF : Linear variable bandpass filter

☞ **When light enters a specific location, only certain wavelength pass through the filter.**

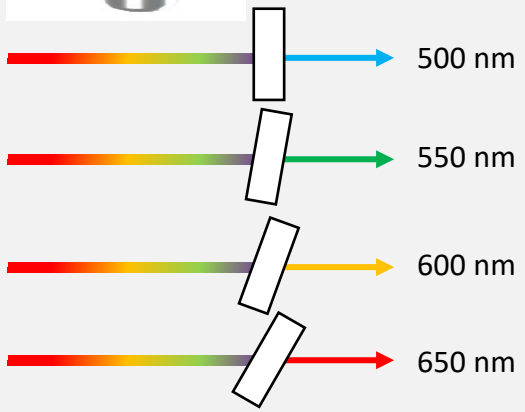


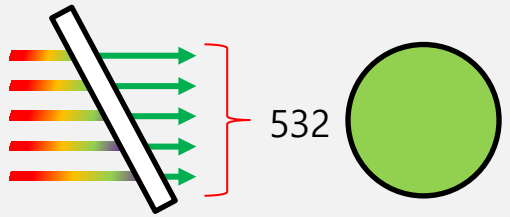
Differences in precision occur depending on beam size



ADTF : Angle dependent tunable filter (FWS)

☞ **When light enters with a specific angle, only certain wavelength pass through the filter.**





Uniform wavelength distribution

Advantages	*Disadvantages*
- High transmission	- Poor edge steepness
- High damage threshold	- Slow tuning speed
- Polarization insensitive	- Limited tuning Range
	- Limit of precision

Advantages
- High transmission
- Wide tuning Range
- High edge steepness : narrow FHWM
- High out of band blocking

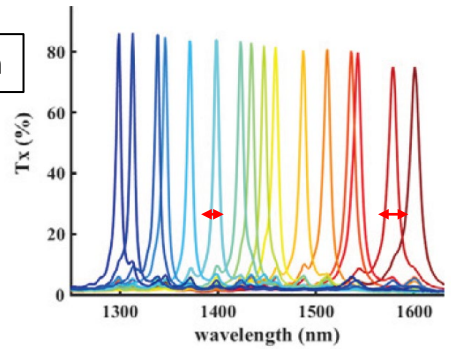
Flexible Wavelength Selector (FWS) Strength

"The ONLY tunable bandpass filter that adjusts bandwidth uniformly across all wavelengths."

Accurate and adjustable bandwidth

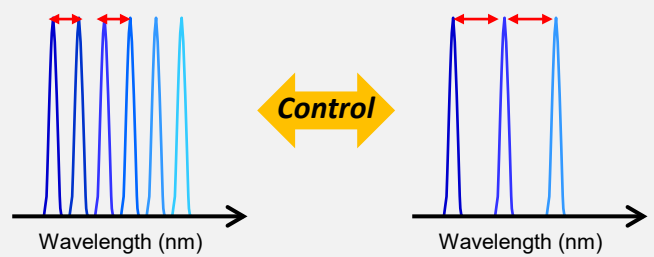
Others : Irregular Bandwidth

Irregular bandwidth

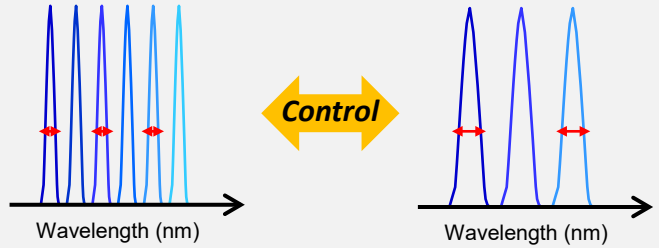


FWS : Regular CWL & Bandwidth control

Constant Center Wavelength



Constant Adjustable bandwidth

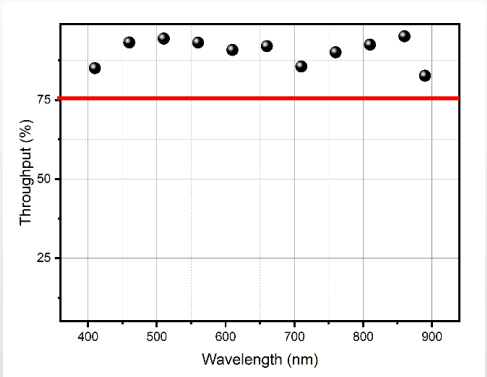


Flexible Wavelength Selector (FWS) Strength

Twinfilm™ technology surpasses the competition and exudes unparalleled sophistication.

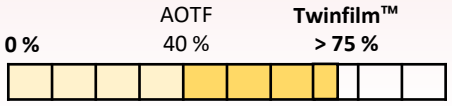
High transmission efficiency

More than 75% transmission efficiency at all wavelength

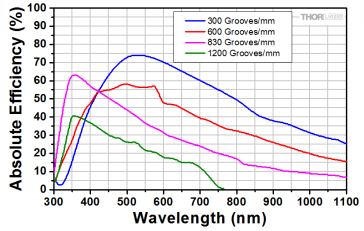


competitiveness **" Transmission efficiency (%) "**

competitive technology
- ✓ **Uneven efficiency by wavelength**
- ✓ **Low efficiency**

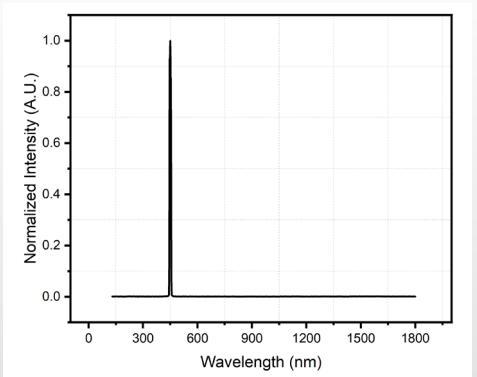


Grating



Select the desired wavelength

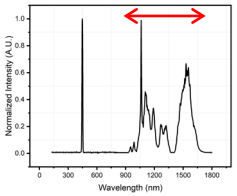
Extract only the input wavelength



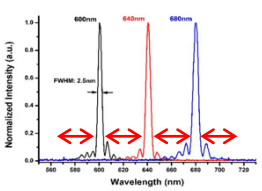
competitiveness **" Out of band suppression "**

competitive technology
- ✓ **Unwanted wavelength detection**
- ✓ **Side lobes occur**

Filter

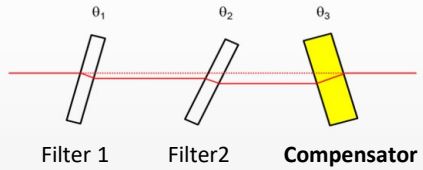


AOTF



No distortion

With no distortion, it can apply various imaging methods.

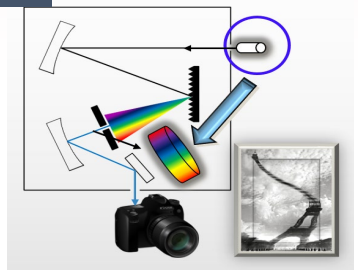


The compensator prevents the beam path from becoming distorted and maintains good pointing stability.

competitiveness **" Distortion free "**

competitive technology
- ✓ **Distortion occurs by selecting the wavelength through a slit.**

Monochromator



Flexible Wavelength Selector (FWS) Poly type

FWS-Poly-**Red**

More Precise

✓ FWHM adjustable
2 – 15 nm (nominal)

Precise bandwidth control

Applications

- Sensor Calibration
- Hyperspectral Imaging
- Fluorescence Imaging

Common Specifications

1. **Broadband spectral range**
   255 – 1700 nm
2. **High damage threshold**
   < 2 MW/㎠ (CW)
3. **High throughput**
   > 75 %
4. **Diverse aperture size**
   5 or 10 mm
5. **Great out of band blocking**

FWS-Poly-Red	*FWS-Poly-Blue*
OD 10 up to 1700 nm	*OD 5 in tuning range, OD 10 in spectral range up to 1700 nm*

6. **Does not affect beam shape**
   Distortion free

FWS-Poly-**Blue**

✓ FWHM fixed
10 or 20 nm (nominal)

Appropriate precision and improved output power

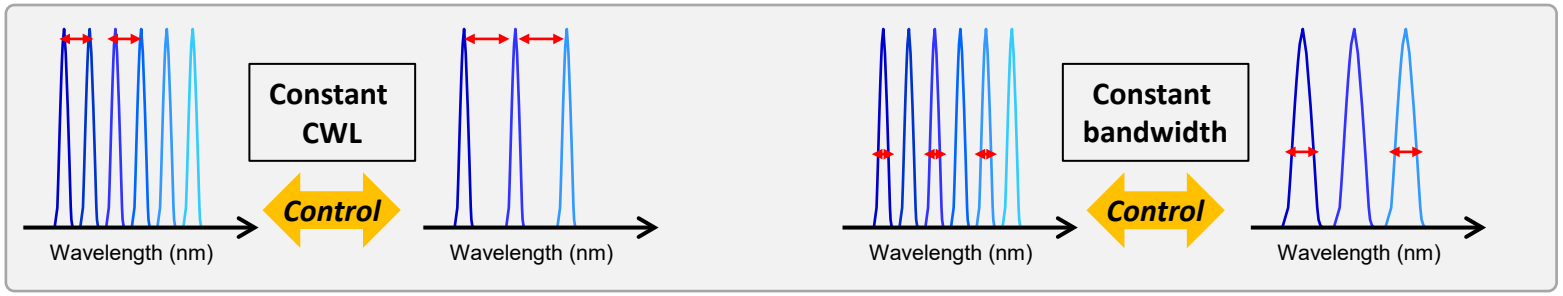
Applications

- Light source for Inspection
- Multispectral Imaging
- Fluorescence Imaging

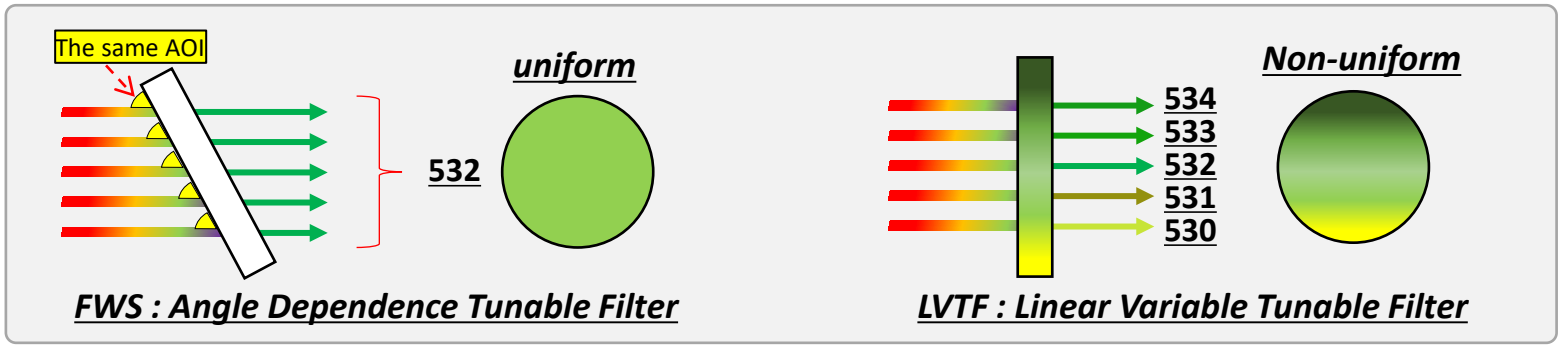
Strongpoint of Tunable Laser System (TLS) using FWS

1. Broadband tunablity up to SWIR (410 - 1700 nm) with one-box system

2. Accurate and adjustable bandwidth control using S/W : Regular CWL & Bandwidth



3. Uniform wavelength distribution inside the beam



4. Free customization of wavelength and output power range according to users needs


SLi
Light Done Right!