



CHROMA

T E C H N O L O G Y C O R P

Chroma Technology is an employee owned company that specializes in the design and manufacture of precision optical filters and coatings. Our filters are designed for a variety of applications, including fluorescence microscopy, which require the greatest accuracy in color separation, optical quality, and signal purity.

The GFP brochure describes most of the filter sets that we have developed for viewing and imaging the various GFP mutants. For each filter set we have provided a spectral trace and, when applicable, a note on the unique quality of that set.

Inside the back cover you will find a pocket which contains application notes. We will forward additional material as collected.

Chroma's filter designs will keep pace with the rapidly emerging applications. Please contact us if our filter set lists do not contain the combination that you require.

For the most current information please visit our web site www.chroma.com.

Cover Image: Fluorescent Protein Spectra by George Patterson, Rich N. Day and David Piston, Courtesy Journal of Cell Science 2001 (114, pp. 837-838)

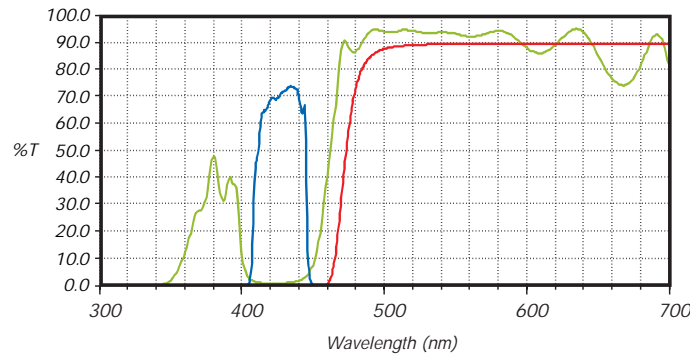
Inside Cover Image: Dr. Steve Kay and Dr. Jeff Plautz, University of Virginia





11003 wtGFP (longpass emission)

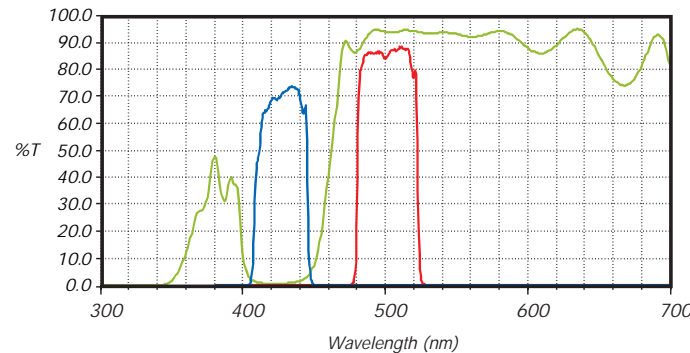
exciter	D425/40
dichroic	460DCLP
emitter	GG475LP



Violet excitation with longpass emission. Shorter wavelength excitation, e.g. UV and Violet, may increase photobleaching.

31019 wtGFP (bandpass emission)

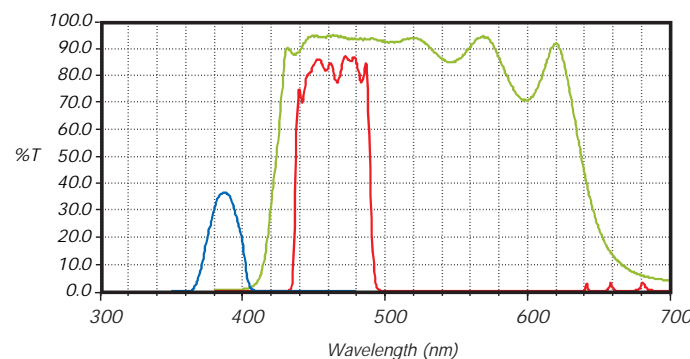
exciter	D425/40
dichroic	460DCLP
emitter	D500/40



A bandpass emission filter is especially important when using GFP with a second and longer wavelength fluorochrome.

31021 Blue GFP

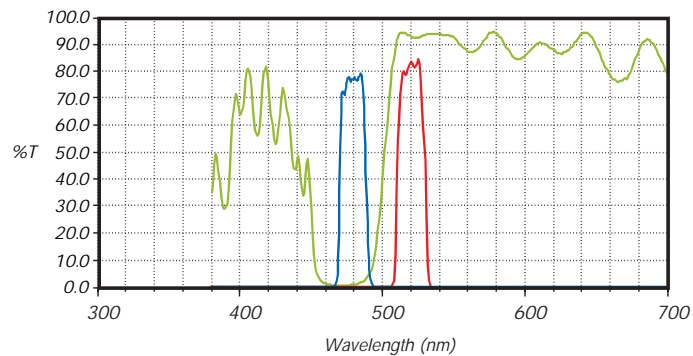
exciter	D390/22
dichroic	420DCLP
emitter	D460/50



One of two Chroma BFP filter sets. When testing the two versions, the narrow excitation filter was preferred by Dr. Steve Kay of Scripps Research Institute, whom we have worked with on other GFP filter sets. The narrow excitation filter avoids 365nm excitation of NADH.

31026 Narrow band excitation and emission

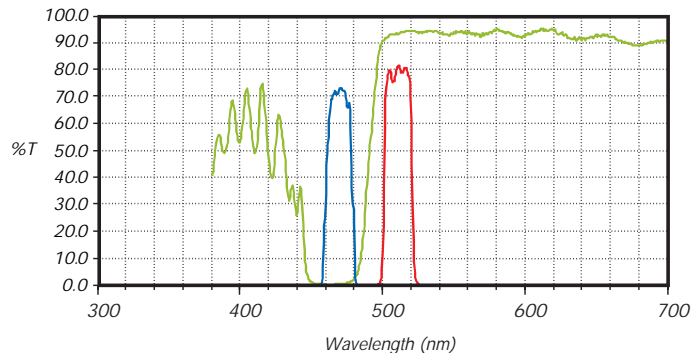
■ exciter	D480/20
■ dichroic	490DCLP
■ emitter	D520/20



This filter set was an early attempt at eliminating auto-fluorescence with the use of narrow band excitation and emission filters.

31039 JP1 (for EGFP when used with YGFP)

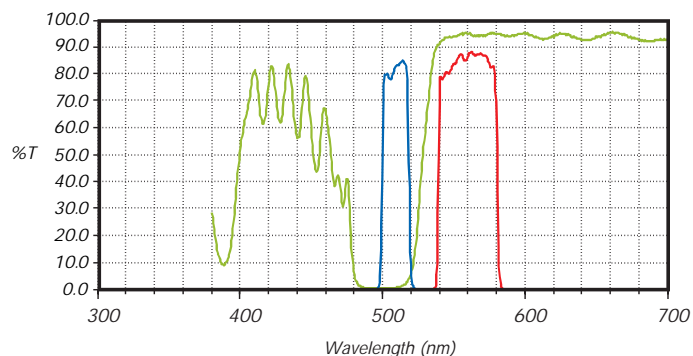
■ exciter	D470/20
■ dichroic	490DCLP
■ emitter	D510/20



The spectral characteristics of this filter set were described by Dr. Jonathon Pines of the University of Cambridge. Dr. Pines has used this filter set, together with filter set 31040 (JP2), for dual imaging EGFP and EYFP.

31040 JP2 (for YGFP when used with EGFP)

■ exciter	D510/20
■ dichroic	530DCLP
■ emitter	D560/40

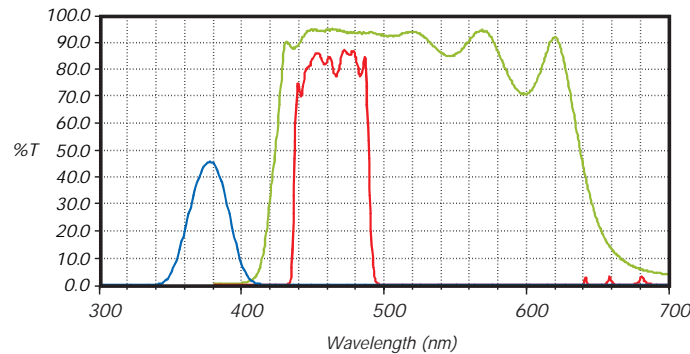


The companion filter set for 31039. To view YFP and exclude GFP, a subtraction algorithm is required.



31041
Blue GFP II

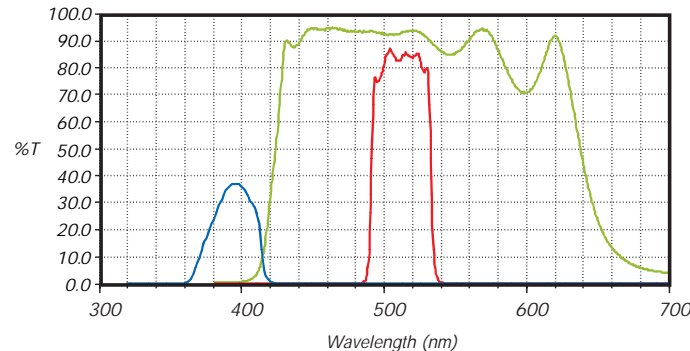
exciter	D380/30
dichroic	420DCLP
emitter	D460/50



The second BFP filter set. While testing these filter sets we found that scientists at Clontech preferred the wider excitation filter and recommended this set to their customers.

31043
Sapphire/UV GFP

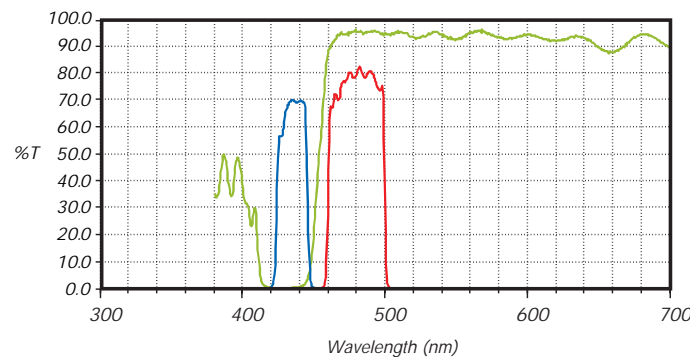
exciter	D395/40
dichroic	425DCLP
emitter	D510/40



Sapphire GFP filter set. We have not seen a lot of interest in this GFP mutant as yet. Its narrow emission band and UV excitation do not seem to make it a good candidate for dual staining with other GFPs. It might be used as a dual label with YFP, if the YFP does not excite in the UV.

31044v2
Cyan GFP

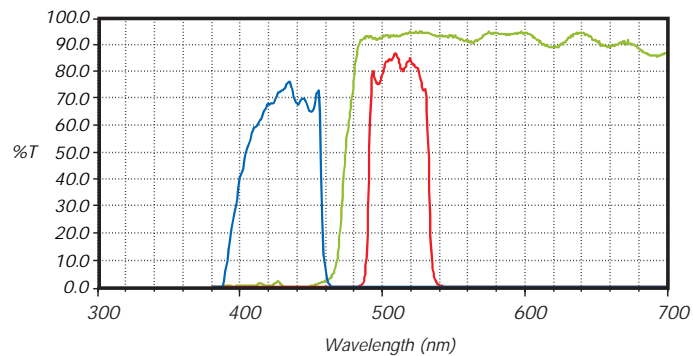
exciter	D436/20
dichroic	455DCLP
emitter	D480/40



Cyan GFP filter set. Well-designed for dual staining with EYFP. Problematic for dual staining with EGFP, as it will likely excite the EGFP.

32000 wtGFP (bandpass emission)

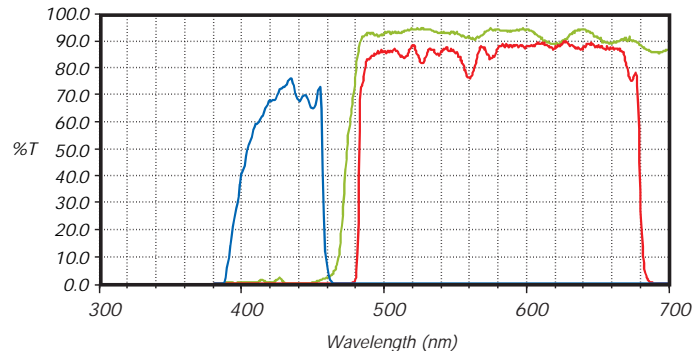
■ exciter	D425/60
■ dichroic	470DCXR
■ emitter	D510/40



Our original wtGFP filter set. The wide excitation attempted to capture the absorption spectrum of the wtGFP. Short wavelength excitation may increase photobleaching.

32001 wtGFP (longpass emission)

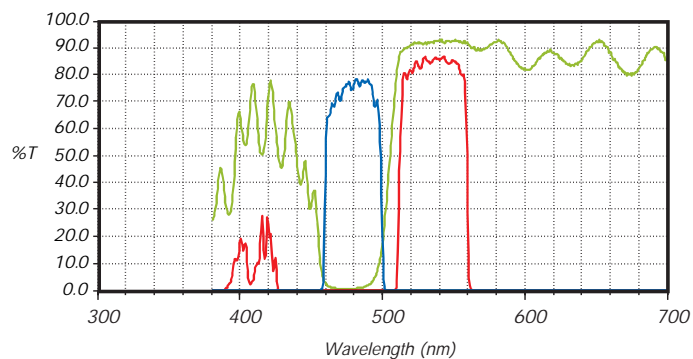
■ exciter	D425/60
■ dichroic	470DCXR
■ emitter	E480LP



The longpass version of filter set 32000.

41001 FITC/EGFP (bandpass emission)

■ exciter	HQ480/40
■ dichroic	Q505LP
■ emitter	HQ535/50

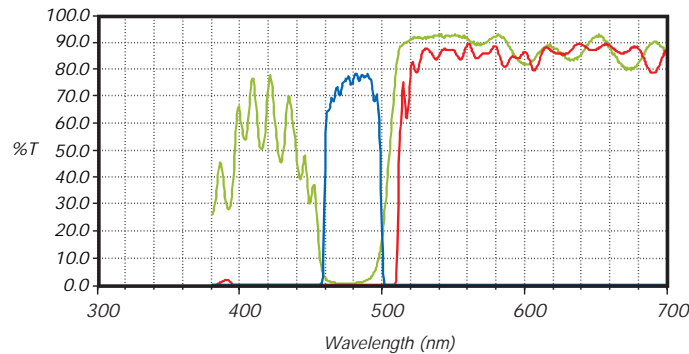


Our original High Q FITC filter set. It also works well with EGFP. This set maximizes the excitation signal but cuts off the short half of the emission spectrum.



41012 FITC/EGFP (longpass emission)

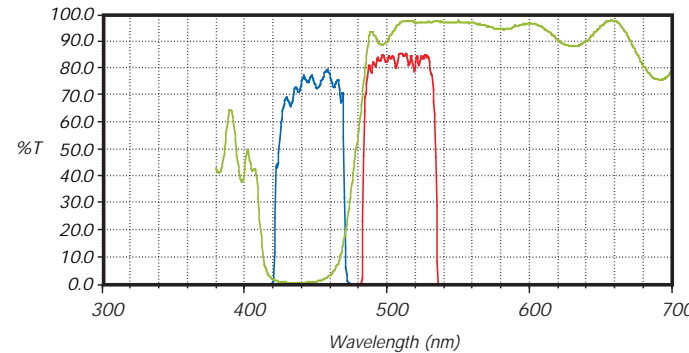
exciter	HQ480/40
dichroic	Q505LP
emitter	HQ510LP



The longpass version of filter set 41001.

41014 wtGFP (bandpass emission)

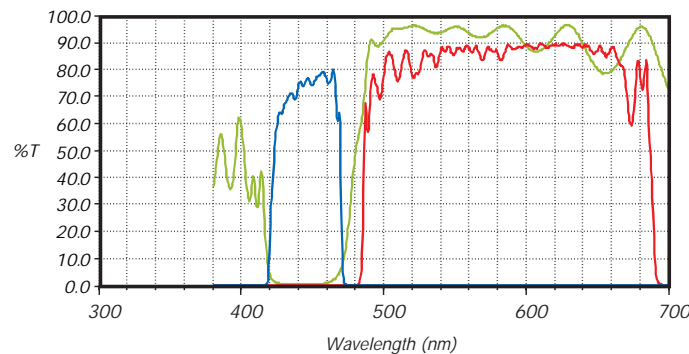
exciter	HQ450/50
dichroic	Q480LP
emitter	HQ510/50



In response to the problems with photobleaching, we switched excitation to the second absorption peak of wtGFP. This filter set was designed to capture most of the fluorescence signal while sacrificing some of the excitation light. This set is better for the wtGFP but also works with EGFP.

41015 wtGFP (longpass emission)

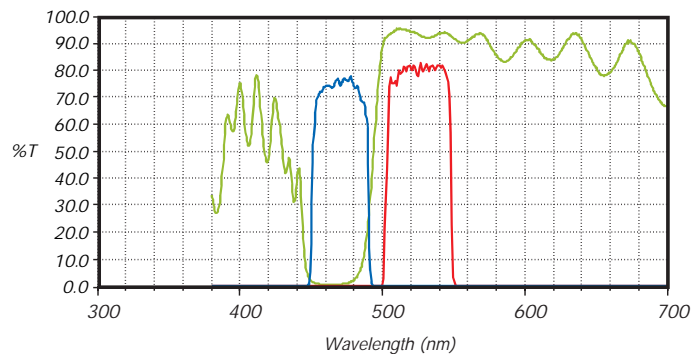
exciter	HQ450/50
dichroic	Q480LP
emitter	HQ485LP



The longpass version of set 41014.

41017 Endow GFP (bandpass emission)

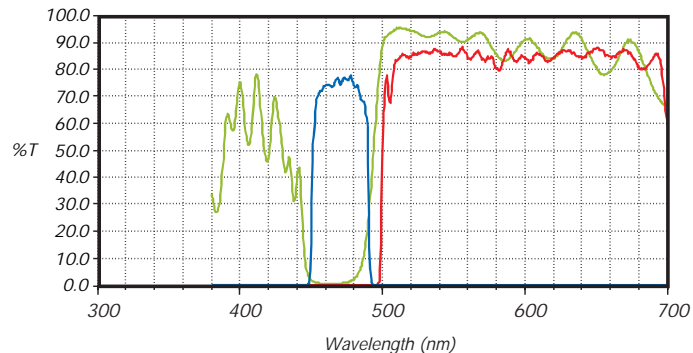
■ exciter	HQ470/40
■ dichroic	Q495LP
■ emitter	HQ525/50



The spectral characteristics of this filter set were specified by Dr. Sharyn Endow of Duke University. Compared to filter set 41014, it captures more of the excitation light while sacrificing some of the fluorescence signal. This set is excellent for both the wtGFP and EGFP. It is our most widely distributed GFP filter set (see Endow and Korma, *J Cell Biology* 137, 1321-1336, 1997).

41018 Endow GFP (longpass emission)

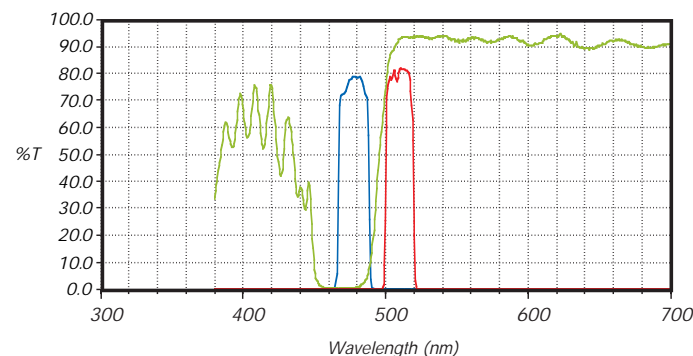
■ exciter	HQ470/40
■ dichroic	Q495LP
■ emitter	HQ500LP



The longpass version of filter set 41017.

41020 Narrow band excitation and emission

■ exciter	HQ480/20
■ dichroic	Q495LP
■ emitter	HQ510/20

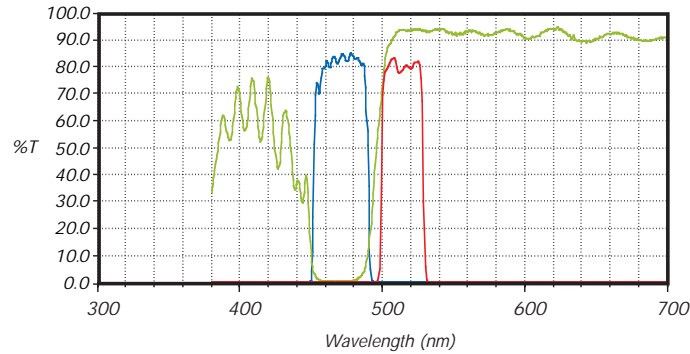


An early High Q attempt at eliminating auto-fluorescence with use of narrow band excitation and emission filters.



41025
Piston GFP

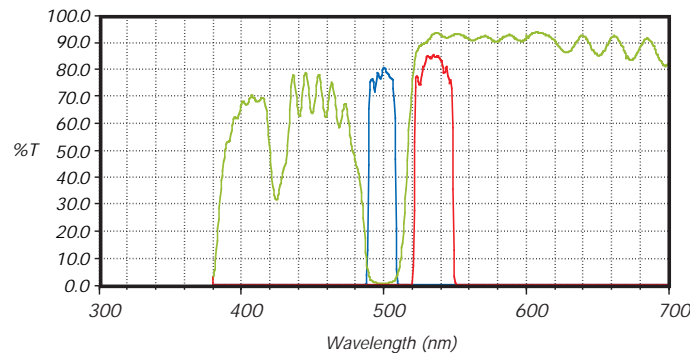
exciter	HQ470/40
dichroic	O495LP
emitter	HQ515/30



The spectral characteristics of this filter set were specified by Dr. David Piston of Vanderbilt University. The narrow emission filter was designed to quantitate the EGFP fluorescence while avoiding auto-fluorescence at wavelengths longer than 540nm (Patterson, G.H., S.M. Knobel, W.D. Sharif, S.R. Kain, D.W. Piston. "Use of the Green Fluorescent Protein (GFP) and its Mutants in Quantitative Fluorescence Microscopy" *Biophysical Journal* 73: 2782-2790, 1997.)

41028 Yellow GFP
(bandpass emission)

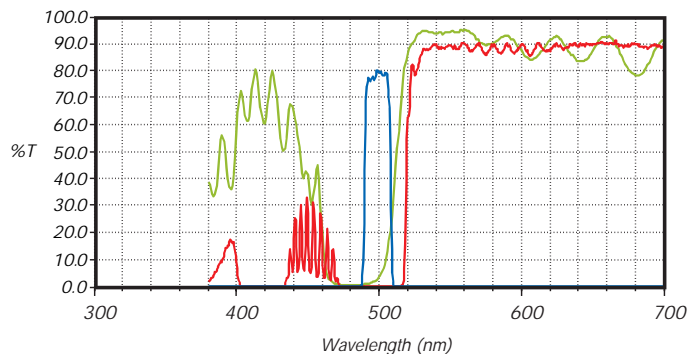
exciter	HQ500/20
dichroic	O515LP
emitter	HQ535/30



High Q bandpass emission filter set for EYFP. Well-designed for dual staining with CFP.

41029 Yellow GFP
(longpass emission)

exciter	HQ500/20
dichroic	O515LP
emitter	HQ520LP



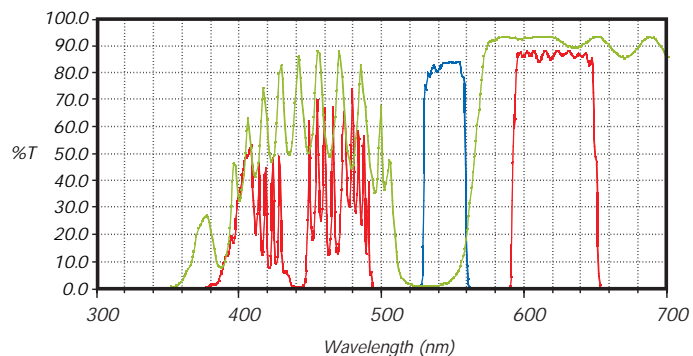
The longpass version of set 41028.



41002c

DsRed

■ exciter	HQ545/30
■ dichroic	Q570LP
■ emitter	HQ620/60

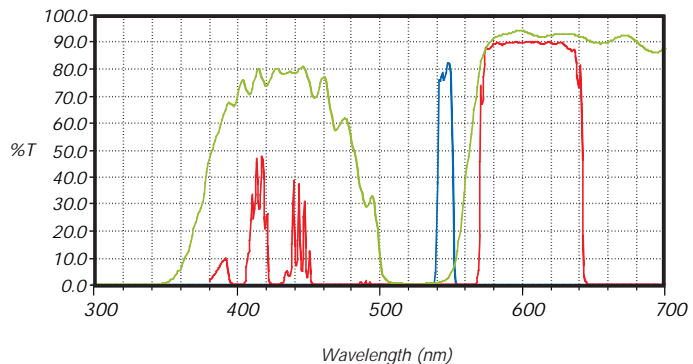


A variety of filter sets will work for red fluorescent protein. This set is best for visualizing DsRed.

41035

DsRed

■ exciter	HQ546/12
■ dichroic	Q560LP
■ emitter	HQ605/75



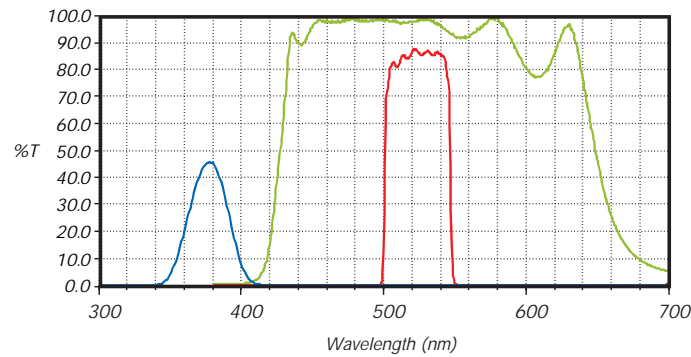
Custom narrow band excitation set designed for very specific applications with DsRed.



31034 BFP/GFP FRET (BP)

exciter	D380/30
dichroic	425DCLP
emitter	D525/50

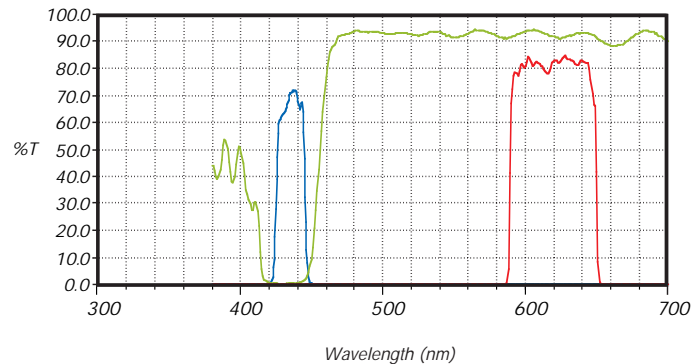
The sets listed below are examples of sets that can be used for fluorescence resonance energy transfer. There are other sets that can be used. Please call for specifications of other sets.



BFP and GFP were the original fluorescent protein FRET pair. Not as widely used due to the photostability of the BFP and the need to excite living cells in the UV. This is the bandpass/wide excitation version of our BFP/GFP FRET sets. We have several additional BFP/GFP FRET pairs. Call for more details.

31051 CFP/DsRed FRET

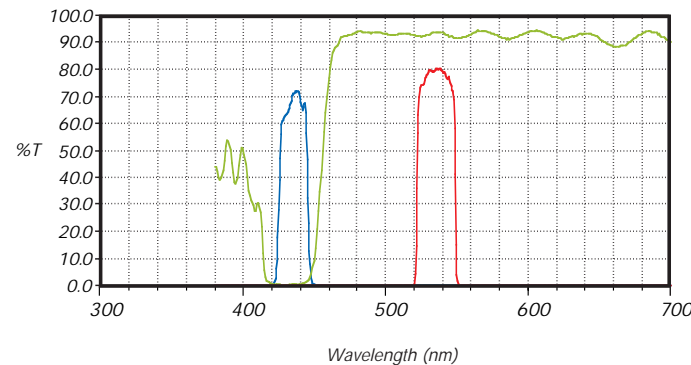
exciter	D436/20
dichroic	455DCLP
emitter	D620/60



CFP and DsRed should prove to be a useful FRET pair. There is significant overlap between the emission wavelengths of CFP and broad excitation range of DsRed. Additionally, the red emission of the DsRed should be well separated from the broad emission tail of CFP, allowing for a fairly clean FRET signal.

31052 CFP/Topaz FRET

exciter	D436/20
dichroic	455DCLP
emitter	D535/30

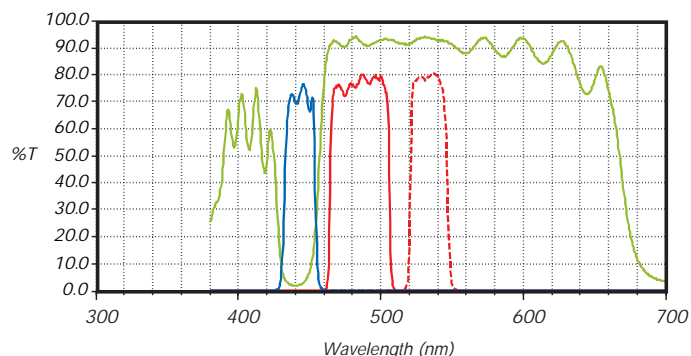


Our standard FRET set for use with CFP and EYFP. The broad emission tail of CFP requires that ratio imaging be performed to identify the FRET signal. Call for details.



71007a Cameleons 2

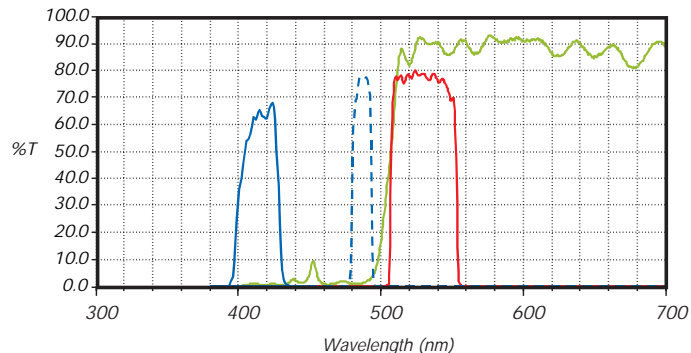
■ exciter	D440/20
■ dichroic	455DCLP
■ emitter	D485/40
■ emitter	D535/30



Chroma's revision of the filter set described by Dr. Roger Tsien for Cameleons 2 FRET (see Miyawaki, et al, *Nature* 388, pp. 882–887, 1997). Depending on the hardware available, there may be the need for an emission separating beamsplitter.

71009 LS/P Cyan/Topaz dual excitation single emission

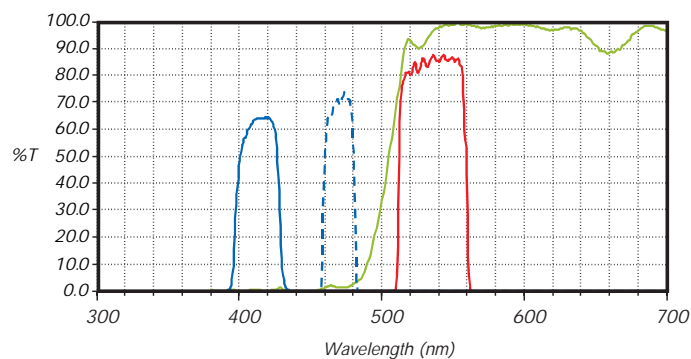
■ exciter	D414/30
■ exciter	HQ487/15
■ dichroic	505DCXR
■ emitter	HQ530/50



This filter set was specified by Dr. John Presley from the lab of Dr. Jennifer Lippincott-Schwartz. The excitation filters were designed to excite one of the proteins without exciting the other. This allows one to capture each image sequentially and overlay the results (see Ellenberg, et al, *BioTechniques* 25, pp. 838–846 November, 1998).

71012 pH Sensitive GFP

■ exciter	D410/30
■ exciter	HQ470/20
■ dichroic	500DCXR
■ emitter	HQ535/50

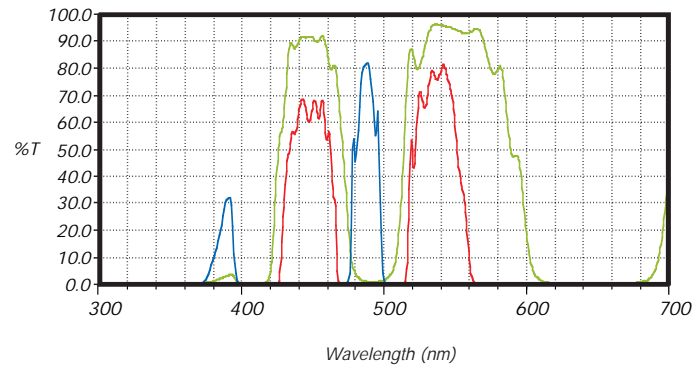


A custom filter set designed to image the changes in spectral characteristics of pH-sensitive GFP mutants. This is a dual excitation, single emission set requiring hardware for the dual excitation protocol (see Miesenbock, et al, *Nature*, 394, July 1998).



51014 BFP/GFP dual band filter set

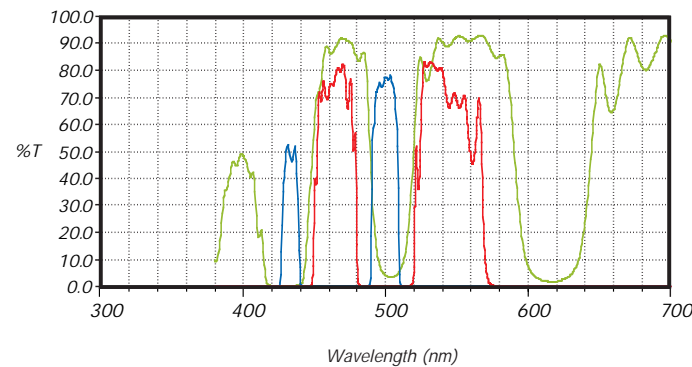
exciter	51014x
dichroic	51014bs
emitter	51014m



Dual band filter set for simultaneous viewing of Blue and Green GFPs.

51017 CFP/YFP dual band filter set

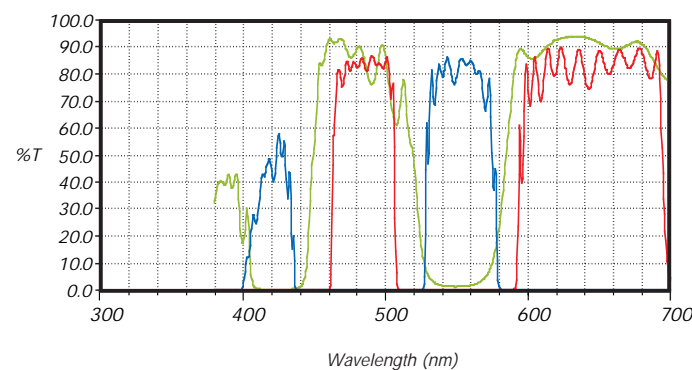
exciter	51017x
dichroic	51017bs
emitter	51017m



Dual band filter set for simultaneous viewing of Cyan and Yellow GFPs.

51018 CFP/DsRed dual band filter set

exciter	51018x
dichroic	51018bs
emitter	51018m

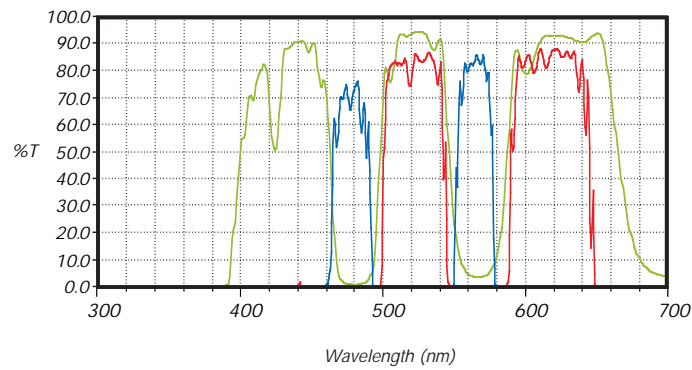


Dual band filter set for simultaneous viewing of Cyan GFP and DsRed.



51019 GFP/DsRed dual band filter set

■ exciter	51019x
■ dichroic	51019bs
■ emitter	51019m



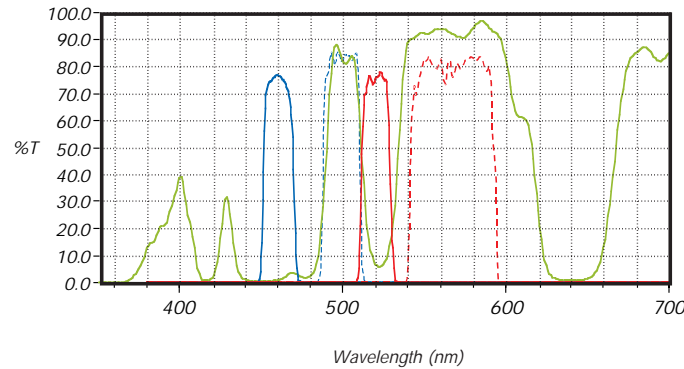
Dual band filter set for simultaneous viewing of the Green GFP and DsRed.



86001 JP3 for EGFP and YFP

exciter	S460/20
exciter	S523/20
86001bs beamsplitter	
emitter	S500/22
emitter	S568/50

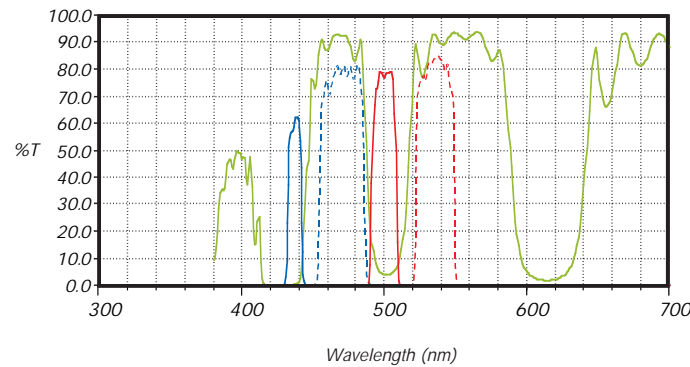
These filter sets usually require a filter wheel on excitation and emission. The beamsplitter remains stationary while the excitation and emission filters change. The proteins are individually excited and their emissions are captured sequentially.



The spectral characteristics of this filter set were specified by Dr. Jonathon Pines of the University of Cambridge.

86002v1 JP4 for CFP and YFP

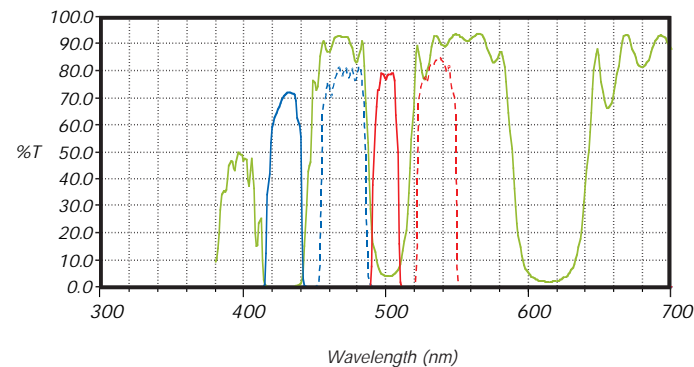
exciter	S436/10
exciter	S500/20
86002bs v1 beamsplitter	
emitter	S470/30
emitter	S535/30



Version 1 is designed for mercury excitation, as the CFP excitation filter is centered directly on a spike in the mercury spectrum and is only 10nm wide.

86002v2 JP4 for CFP and YFP

exciter	S430/25
exciter	S500/20
86002bs v2 beamsplitter	
emitter	S470/30
emitter	S535/30

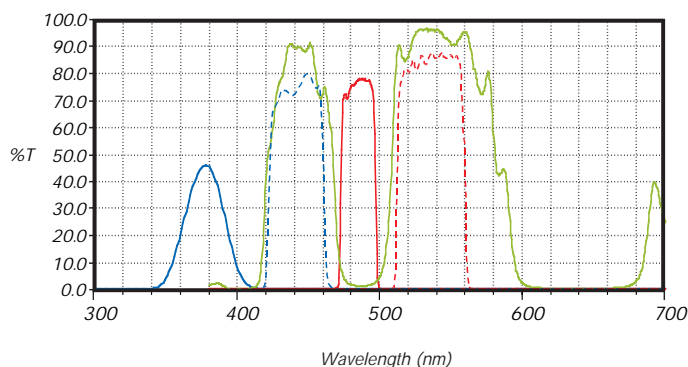


The excitation filter of version 2 is centered at 430nm and is 25nm wide, which allows this set to be used with either xenon or mercury excitation.

86003 for BFP and EGFP

■ exciter	S380/30
■ exciter	S485/25
■ 86003bs beamsplitter	
■ emitter	S445/40
■ emitter	S535/50

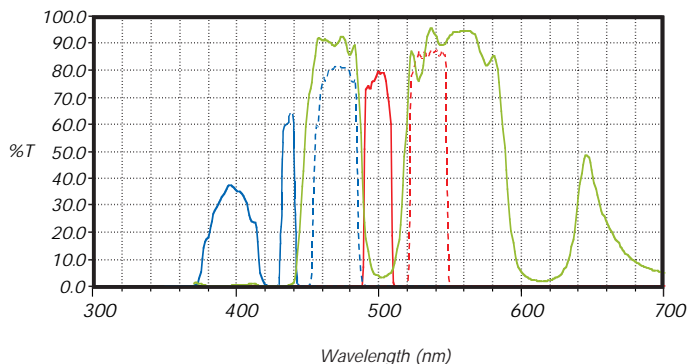
These filter sets usually require a filter wheel on excitation and emission. The beamsplitter remains stationary while the excitation and emission filters change. The proteins are individually excited and their emissions are captured sequentially.



Used for the sequential imaging of Blue GFP and Green GFP.

86004 JP5 for UVGFP (Sapphire), CFP and YFP v1

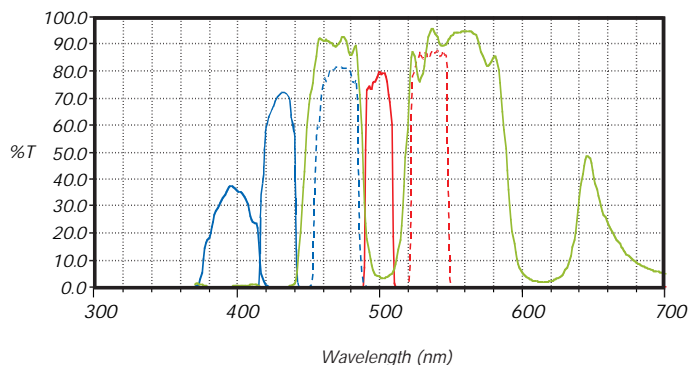
■ exciter	S395/40
■ exciter	S436/10
■ exciter	S500/20
■ 86004bs v1 beamsplitter	
■ emitter	S470/30
■ emitter	S535/30



Version 1 is designed for mercury excitation, as the CFP excitation filter is centered directly on a spike in the mercury spectrum and is only 10nm wide.

86004 JP5 for UVGFP (Sapphire), CFP and YFP v2

■ exciter	S395/40
■ exciter	S430/25
■ exciter	S500/20
■ 86004bs v2 beamsplitter	
■ emitter	S470/30
■ emitter	S535/30



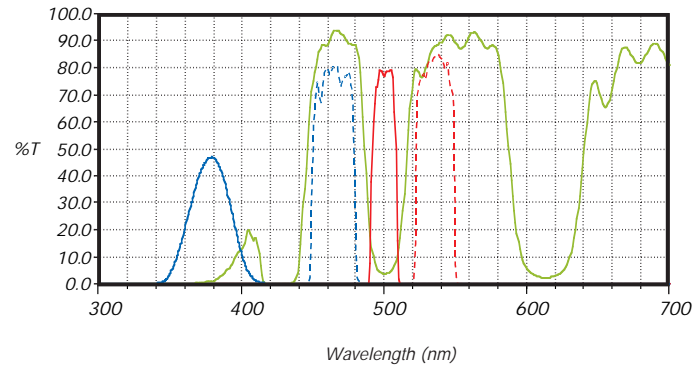
The excitation filter of version 2 is centered at 430nm and is 25nm wide which allows this set to be used with either xenon or mercury excitation.



86005 for BFP and YFP

exciter	S380/30
exciter	S500/20
86005bs beamsplitter	
emitter	S465/40
emitter	S535/30

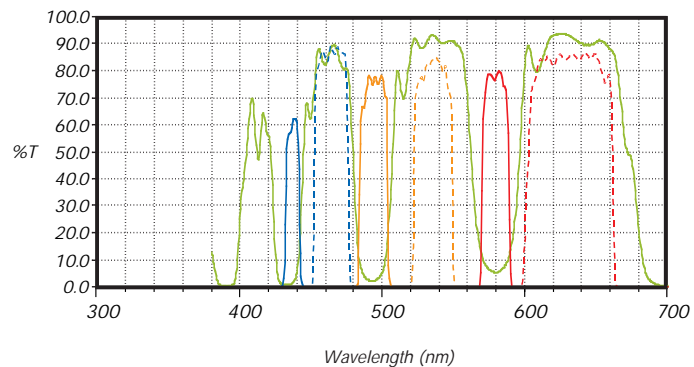
These filter sets usually require a filter wheel on excitation and emission. The beamsplitter remains stationary while the excitation and emission filters change. The proteins are individually excited and their emissions are captured sequentially.



Used for the sequential imaging of Blue and Yellow GFP.

86006 CFP/YFP and DsRed

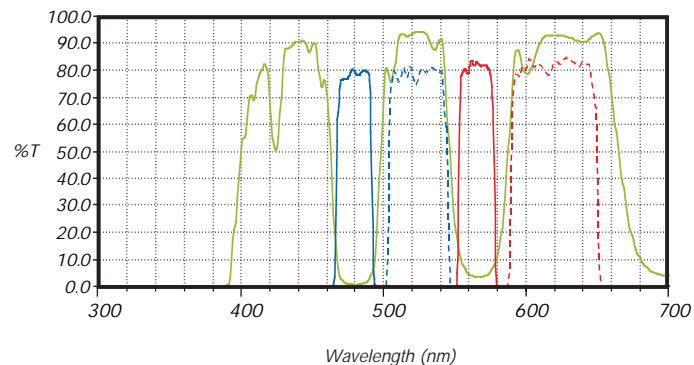
exciter	S436/10
exciter	S495/20
exciter	S580/20
86006bs beamsplitter	
emitter	S470/30
emitter	S535/30
emitter	S630/60



Set is designed for mercury or xenon excitation to sequentially visualize Cyan, Yellow and DsRed.

86007 GFP and DsRed

exciter	S485/25
exciter	S565/25
86007bs beamsplitter	
emitter	S520/40
emitter	S620/60



Used for the sequential imaging of the Green GFP and DsRed.

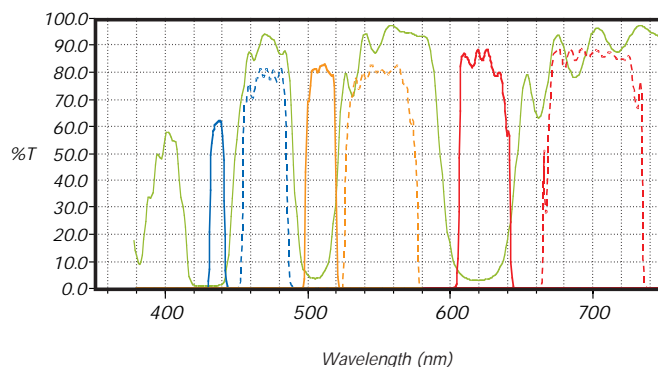
CHROMA

TECHNOLOGY CORP

These filter sets usually require a filter wheel on excitation and emission. The beamsplitter remains stationary while the excitation and emission filters change. The proteins are individually excited and their emissions are captured sequentially.

86008v1 CFP/YFP/Cy5

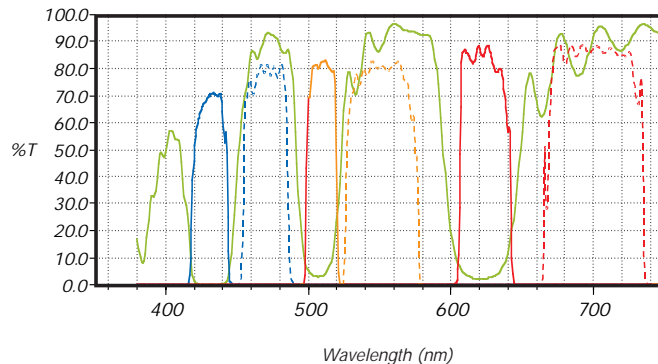
■ exciter	S436/10
■ exciter	S510/20
■ exciter	S622/36
■ 86008bs beamsplitter	
■ emitter	S470/30
■ emitter	S550/50
■ emitter	S700/75



Version 1 is designed for mercury excitation, as the CFP excitation filter is centered directly on a spike in the mercury spectrum and is only 10nm wide.

86008v2 CFP/YFP/Cy5

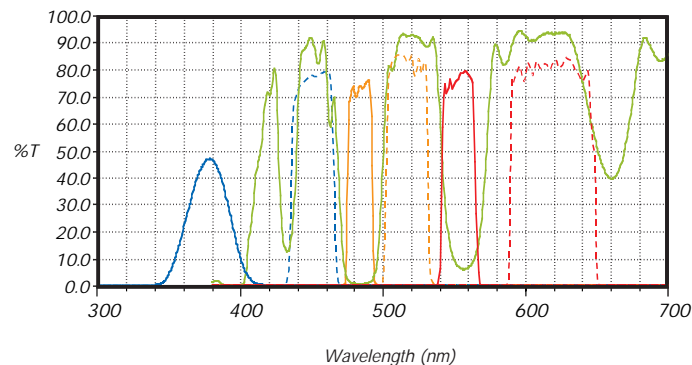
■ exciter	S430/25
■ exciter	S510/20
■ exciter	S622/36
■ 86008bs beamsplitter	
■ emitter	S470/30
■ emitter	S550/50
■ emitter	S700/75



The excitation filter of version 2 is centered at 430nm and is 25nm wide, which allows this set to be used with either xenon or mercury excitation.

86009 BFP/GFP and DsRed

■ exciter	S380/30
■ exciter	S485/17
■ exciter	S555/25
■ 86009bs beamsplitter	
■ emitter	S450/30
■ emitter	S515/30
■ emitter	S620/60



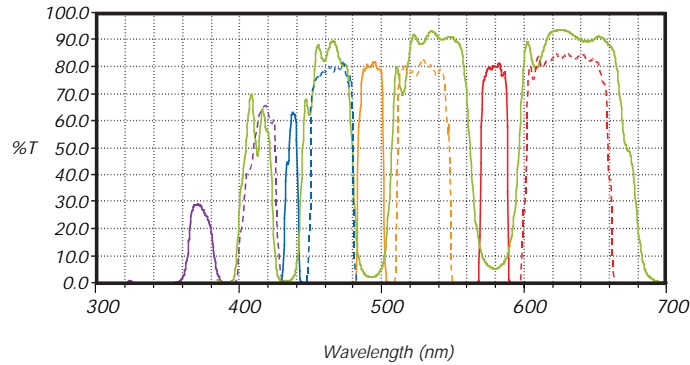
Used for the sequential imaging of the Blue GFP, Green GFP and DsRed.



86010 BFP (or DAPI)/CFP/YFP and DsRed (or Texas Red)

exciter	S375/20
exciter	S436/10
exciter	S492/18
exciter	S580/20
86010bs beamsplitter	
emitter	S415/24
emitter	S465/25
emitter	S530/40
emitter	S630/60

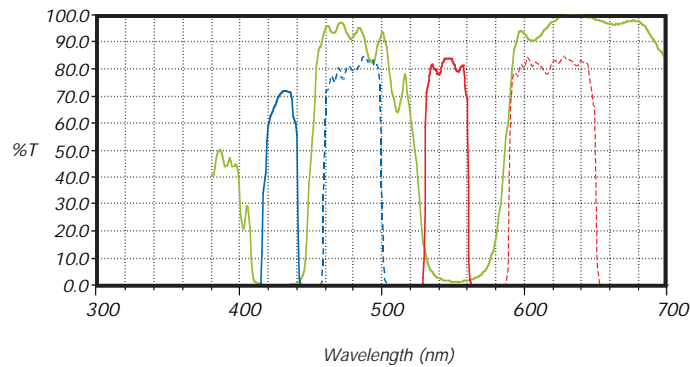
These filter sets usually require a filter wheel on excitation and emission. The beamsplitter remains stationary while the excitation and emission filters change. The proteins are individually excited and their emissions are captured sequentially.



Used for the sequential imaging of Blue, Cyan and Yellow GFPs and DsRed. CFP excitation specifically designed for use with mercury excitation.

86011 for CFP and DsRed

exciter	S430/25
exciter	S545/30
86011bs beamsplitter	
emitter	S480/40
emitter	S620/60



Used for the sequential imaging of Cyan GFP and DsRed. Can be used with both mercury and xenon excitation.

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Cover Image: Fluorescent Protein Spectra by George Patterson, Rich N. Day and David Piston, Courtesy *Journal of Cell Science* 2001 (114, pp. 837-838).

Inside Cover Image: Dr. Steve Kay and Dr. Jeff Plautz, University of Virginia.

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