

## Yellow fluorescent protein TurboYFP

- Superbright true-yellow fluorescence
- Fast maturation
- Destabilized version is available
- Recommended for gene expression analysis and cell labeling

### Description

TurboYFP is an enhanced variant of the yellow fluorescent protein PhiYFP from jellyfish *Phialidium* sp. (Shagin *et al.*, 2002). Possessing superbright yellow fluorescence with emission maximum at 538 nm, TurboYFP is ideally positioned between green and red fluorescent proteins, allowing easy separation of these fluorescent markers by flow cytometry using common channels of detection and a single laser excitation line. Compared with PhiYFP, TurboYFP matures faster in mammalian cells.

TurboYFP is mainly intended for applications where fast appearance of bright fluorescence is crucial. It is specially recommended for cell labeling and tracking the promoter activity. Destabilized TurboYFP variant allows accurate analysis of rapid and/or transient events in gene regulation.

### Main properties of TurboYFP

Characteristic	
Molecular weight	26 kDa
Polypeptide length	234 aa
Fluorescence color	yellow
Excitation max	525 nm
Emission max	538 nm
Quantum yield	0.53
Extinction coefficient	105 000 M <sup>-1</sup> cm <sup>-1</sup>
Brightness*	55.7
Brightness % of EGFP	169
pKa	5.9
Structure	dimer
Aggregation	at high concentration
Maturation rate at 37°C	superfast
Photostability	high

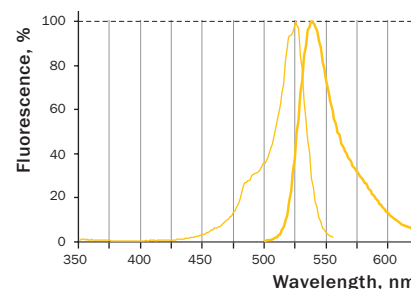
\*Brightness is a product of extinction coefficient and quantum yield, divided by 1000.

### Performance and use

TurboYFP can be expressed and detected in a wide range of organisms. Mammalian cells transiently transfected with TurboYFP expression vectors give bright fluorescent signals in 8-10 hrs after transfection.

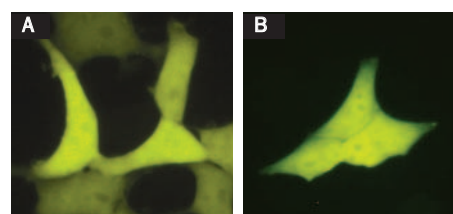
Being overexpressed in long-term culture of cells with high expression levels, TurboYFP shows slight tendency to aggregate. It might limit TurboYFP use in such experimental systems. Please use Phi-Yellow proteins for stable expression and for organelle labeling.

TurboYFP can be used in multicolor labeling applications with cyan, green, red, and far-red fluorescent dyes.



### TurboYFP normalized excitation (thin line) and emission (thick line) spectra.

Complete TurboYFP spectra in Excel format can be downloaded from the Evrogen Web site at [www.evrogen.com/TurboYFP.shtml](http://www.evrogen.com/TurboYFP.shtml)



### TurboYFP expression in mammalian cells.

A — Whole-cell expression in Phoenix cells;  
B — whole-cell expression in HeLa cells.

### Available variants and fusions

TurboYFP codon usage is optimized for high expression in mammalian cells (Haas *et al.*, 1996), but it can be successfully expressed in many other heterologous systems.

#### Destabilized TurboYFP variant

Destabilized TurboYFP variant (TurboYFP-dest1) is produced by fusing the initial protein with PEST amino acid sequence encoded by region 422-461 of mouse ornithine decarboxylase gene (Li *et al.*, 1998). This sequence targets the protein to degradation and enables a rapid protein turnover. TurboYFP-dest1 retains spectral properties of the initial protein, but has shorter half-lives (approximately 1.5-2 hrs) as measured by the analysis of fluorescence intensity of cells treated with a protein synthesis inhibitor, cycloheximide. Because of rapid turnover, TurboYFP-dest1 can be used to measure changes in gene expression.

#### Phi-Yellow proteins

Phi-Yellow proteins (PhiYFP and PhiYFP-m) are previous variants of TurboYFP. They possess the same excitation and emission spectra but have a few lesser maturation rates in mammalian cells. Phi-Yellow proteins do not aggregate in long-term cell cultures and in fusions with subcellular localization signals. They have proven suitable to generate stably transfected cell lines.

Please see Phi-Yellow proteins description at [www.evrogen.com/PhiYFP.shtml](http://www.evrogen.com/PhiYFP.shtml).

#### Recommended filter sets and antibodies

TurboYFP can be detected using Omega Optical filter set XF104-3 or Chroma Technology corporation filter set 42003 ("ZsYellow1").

TurboYFP can be recognized using Anti-PhiYFP and Anti-PhiYFP(d) antibodies (Cat.# AB601-AB604) available from Evrogen.

#### TurboYFP licensing opportunities

Evrogen technology embodied in TurboYFP is available for expanded and commercial use with an adaptable licensing program. Benefits from flexible and market-driven license options are offered for upgrade and novel development of products and applications.

For licensing information, please contact Evrogen at [license@evrogen.com](mailto:license@evrogen.com).

#### References

- Haas *et al.* (1996) *Curr. Biol.* 6: 315–324.
- Li *et al.* (1998) *J. Biol. Chem.* 273:34970-34975.
- Rizzuto *et al.* (1989) *J. Biol. Chem.* 264: 10595–10600.
- Rizzuto *et al.* (1995) *Curr. Biol.* 5: 635–642.
- Shagin *et al.* (2004) *Mol. Biol. Evol.* 21(5): 841-850.

## TurboYFP-related products

Product	Cat.#	Description	Size
<b>TurboYFP expression/source vectors</b>			
pTurboYFP-C	FP611	Mammalian expression vector encoding humanized TurboYFP and allowing TurboYFP expression and generation of fusions to the TurboYFP C-terminus	20 µg
pTurboYFP-N	FP612	Mammalian expression vector encoding humanized TurboYFP and allowing TurboYFP expression and generation of fusions to the TurboYFP N-terminus	20 µg
pTurboYFP-B	FP613	Bacterial expression vector; source of the humanized TurboYFP coding sequence	20 µg
pTurboYFP-PRL	FP615	Promoterless expression vector encoding humanized TurboYFP and designed for monitoring transcription from different promoters and promoter/enhancer combinations	20 µg
pTurboYFP-PRL-dest1	FP618	Promoterless vector encoding destabilized TurboYFP and designed for monitoring transcription from different promoters and promoter/enhancer combinations	20 µg
pTurboYFP-dest1	FP619	Mammalian expression vector encoding destabilized TurboYFP for its expression and generation of fusions to the TurboYFP-dest1 N-terminus	20 µg
<b>Antibodies against TurboYFP</b>			
Anti-PhiYFP antibody	AB601	Rabbit polyclonal antibody against non-denatured PhiYFP, PhiYFP-m, and TurboYFP	100 µg
	AB602		200 µg
Anti-PhiYFP(d) antibody	AB603	Rabbit polyclonal antibody against denatured PhiYFP, PhiYFP-m, and TurboYFP	100 µg
	AB604		200 µg

Please contact your local distributor for exact prices and delivery information.

### Notice to Purchaser:

TurboYFP-related products: These products are intended for research use only and covered by Evrogen Patents and/or Patent applications pending. By use of these products, you accept the terms and conditions of the applicable Limited Use Label License (available at [www.evrogen.com/Evrogen-FP-license.shtml](http://www.evrogen.com/Evrogen-FP-license.shtml)).

CMV Promoter: The CMV promoter is covered under U.S. Patents 5,168,062 and 5,385,839, and its use is permitted for research purposes only. Any other use of the CMV promoter requires a license from the University of Iowa Research Foundation, 214 Technology Innovation Center, Iowa City, IA 52242.