Table of Fluorochromes

This is a table of some characteristics of fluorochromes useful for flow cytometry or fluorescence microscopy. Within groups, roughly in order of excitation wavelength (families excepted). Peak excitation and emission wavelengths often vary depending on the environment in which the probe finds itself. Be sure to also look up the excitation and emission spectra for your dye of choice. Note that colors you might see with a capable browser are only a very rough approximation!

Probe	Ex (nm)	Em (nm)	MW	Notes
Reactive and conjugated probes				
Hydroxycoumarin	325	386	331	Succinimidyl ester
Aminocoumarin	350	445	330	Succinimidyl ester
Methoxycoumarin	360	410	317	Succinimidyl ester
Cascade Blue	(375);401	423	596	Hydrazide
Pacific Blue	403	455	406	Maleimide
Pacific Orange	403	551		
Lucifer yellow	425	528		
NBD	466	539	294	NBD-X
R-Phycoerythrin (PE)	480;565	578	240 k	
PE-Cy5 conjugates	480;565;650	670		*aka* Cychrome, R670, Tri-Color, Quantum Red
PE-Cy7 conjugates	480;565;743	767		
Red 613	480;565	613		PE-Texas Red
PerCP	490	675		Peridinin chlorphyll protein
TruRed	490,675	695		PerCP-Cy5.5 conjugate
FluorX	494	520	587	(GE Healthcare)
Fluorescein	495	519	389	FITC; pH sensitive
BODIPY-FL	503	512		
TRITC	547	572	444	TRITC
X-Rhodamine	570	576	548	XRITC
Lissamine Rhodamine B	570	590		
Texas Red	589	615	625	Sulfonyl chloride
Allophycocyanin (APC)	650	660	104 k	
APC-Cy7 conjugates	650;755	767		PharRed
Alexa Fluor dyes [antibody conjugates] *(Molecular Probes)*				
Alexa Fluor 350	343	442	410	
Alexa Fluor 405	401	421	1028	

Alexa Fluor 430	434	540	702	
Alexa Fluor 488	499	519	643	QY 0.92
Alexa Fluor 500	503	525	700	
Alexa Fluor 514	517	542	714	
Alexa Fluor 532	530	555	724	QY 0.61
Alexa Fluor 546	561	572	1079	QY 0.79
Alexa Fluor 555	553	568	1250	QY 0.1
Alexa Fluor 568	579	603	792	QY 0.69
Alexa Fluor 594	591	618	820	QY 0.66
Alexa Fluor 610	610	629	1285	
Alexa Fluor 633	632	648	1200	
Alexa Fluor 647	652	668	1300	QY 0.33
Alexa Fluor 660	663	691	1100	
Alexa Fluor 680	680	702	1150	
Alexa Fluor 700	696	719	1400	
Alexa Fluor 750	752	776	1300	
Alexa Fluor 790	782	804	1750	
Cy Dyes				
Cy2	489	506	714	QY 0.12
Cy3	(512);550	570; (615)	767	QY 0.15
Cy3B	558	572; (620)	658	QY 0.67
Cy3.5	581	594; (640)	1102	QY 0.15
Cy5	(625);650	670	792	QY 0.28
Cy5.5	675	694	1128	QY 0.23
Cy7	743	767	818	QY 0.28
DyLight dyes *(Pierce)*				
DyLight 350	353	432		
DyLight 405	400	420		
DyLight 488	493	518		
DyLight 549	562	576		
DyLight 594	593	618		
DyLight 633	638	658		
DyLight 649	654	673		
DyLight 680	692	712		
DyLight 750	752	778		
DyLight 800	777	794		

Nucleic acid probes

Hoechst 33342	343	483	616	AT-selective				
DAPI	345	455		AT-selective				
Hoechst 33258	345	478	624	AT-selective				
SYTOX Blue	431	480	~400	DNA				
Chromomycin A3	445	575		CG-selective				
Mithramycin	445	575						
YOYO-1	491	509	1271					
Ethidium Bromide	493	620	394					
Acridine Orange	503	530/640		DNA/RNA				
SYTOX Green	504	523	~600	DNA				
TOTO-1, TO-PRO-1	509	533		Vital stain, TOTO: Cyanine Dimer TO-PRO: Cyanine Monomer				
Thiazole Orange	510	530						
Propidium Iodide (PI)	536	617	668.4					
LDS 751	543;*590*	712;*607*	472	DNA (543ex/712em), *RNA (590ex/607em)*				
7-AAD	546	647		7-aminoactinomycin D, CG-selective				
SYTOX Orange	547	570	~500	DNA				
TOTO-3, TO-PRO-3	642	661						
DRAQ5	647	681,697	413	(Biostatus) (usable excitation down to 488)				

Cell function probes

Indo-1	361/330	490/405	1010	AM ester. Low/High Ca^{++},				
Fluo-3	506	526	855	AM ester. pH > 6				
DCFH	505	535	529	2'7'Dichorodihydrofluorescein, oxidized form				
DHR	505	534	346	Dihydrorhodamine 123, oxidized form, light catalyzes oxidation				
SNARF	548/579	587/635		pH 6/9				

Fluorescent Proteins

				QY	BR	PS	Source	
Y66H	360	442						
Y66F	360	508						
EBFP	380	440		0.18	9		Addgene	monomer
EBFP2	383	448		0.56	18		Addgene	monomer
Azurite	383	447		0.55	14			monomer
GFPuv	385	508						
T-Sapphire	399	511		0.60	26	25		weak dimer
TagBFP	402	457	26k	0.63	33	++	Evrogen	monomer

Cerulean	433	475		0.62	27	36		weak dimer
mCFP	433	475		0.40	13	64		monomer
ECFP	434	477		0.15	3			
CyPet	435	477		0.51	18	59		weak dimer
Y66W	436	485						
dKeima-Red	440	616		0.31	8		MBL	dimer
mKeima-Red	440	620		0.24	3		MBL	monomer
TagCFP	458	480		0.57	29		Evrogen	dimer
AmCyan1	458	489		0.75	29		Clontech	tetramer
mTFP1 (Teal)	462	492		0.85	54			dimer
S65A	471	504						
Midoriishi-Cyan	472	495		0.9	25		MBL	dimer
Wild Type GFP	396,475	508	26k	0.77	16			
S65C	479	507						
TurboGFP	482	502	26 k	0.53	37		Evrogen	dimer
TagGFP	482	505	27k	0.59	34	++	Evrogen	monomer
TagGFP2	483	506	27k	0.6	34	++	Evrogen	monomer
AcGFP1	484	510	27k	0.82	27		Clontech	
S65L	484	510						
Emerald	487	509		0.68	39	0.69	Invitrogen	weak dimer
S65T	488	511						
EGFP	488	507	26k	0.60	34	174	Addgene	weak dimer
Azami-Green	492	505		0.74	41		MBL	tetramer (monomeric available)
ZsGreen1	493	505	105k	0.91	40		Clontech	tetramer
Dronpa-Green	503	518		0.85	81		MBL	photoswitchable
TagYFP	508	524	27k	0.62	47		Evrogen	monomer
EYFP	514	527	26k	0.61	51	60		weak dimer
Topaz	514	527		0.60	57			monomer
Venus	515	528		0.57	53	15		weak dimer
mCitrine	516	529		0.76	59	49		monomer
YPet	517	530		0.77	80	49		weak dimer
TurboYFP	525	538	26 k	0.53	56		Evrogen	dimer
PhiYFP	525	537	26.8 k	0.40	52	++	Evrogen	weak dimer
PhiYFP-m	525	537	26.8 k	0.39	48	++	Evrogen	monomer
ZsYellow1	529	539		0.65	13		Clontech	tetramer
mBanana	540	553		0.70	4		Clontech	monomer
Kusabira-Orange	548	559		0.60	31		MBL	monomer
mOrange	548	562		0.69	49	9		monomer

mOrange2	549	565		0.60	35		Clontech	monomer
mKO	548	559		0.60	31	122		monomer
TurboRFP	553	574	26 k	0.67	62		Evrogen	dimer
tdTomato	554	581		0.69	95	98	Clontech	tandem dimer
DsRed-Express2	554	591		0.42	15		Clontech	
TagRFP	555	584	27k	0.48	48		Evrogen	monomer
DsRed monomer	557	592	~28k	0.1	3.5	16	Clontech	monomer
DsRed2 ("RFP")	563	582	~110k	0.55	24		Clontech	
mStrawberry	574	596		0.29	26	15	Clontech	monomer
TurboFP602	574	602	26 k	0.35	26		Evrogen	dimer
AsRed2	576	592	~110k	0.21	13		Clontech	tetramer
mRFP1	584	607	~30k	0.25			Tsien lab	monomer
J-Red	584	610		0.20	8.8	13		dimer
mCherry	587	610		0.22	16	96	Clontech	monomer
HcRed1	588	618	~52k	0.03	0.6		Clontech	dimer
mKate2	588	633	26k	0.40	25	+	Evrogen	monomer
Katushka (TurboFP635)	588	635	26k	0.34	22	++	Evrogen	dimer
mKate (TagFP635)	588	635		0.30	15		Evrogen	monomer
TurboFP635	588	635	26 k	0.34	22		Evrogen	dimer
mPlum	590	649		0.10	4.1	53	Clontech	
mRaspberry	598	625		0.15	13		Clontech	monomer; faster photobleach than mPlum
mNeptune	600	650		0.20	13		Tsien Lab	monomer
E2-Crimson	611	646		0.23	29		Clontech	
Other probes								
Monochlorobimane	380	461	226	Glutathione probe				
Calcein	496	517	623	pH > 5				
HyPer	420/500	516		Hydrogen peroxide sensor				

Legend:

- Ex: Peak excitation wavelength (nm)
- Em: Peak emission wavelength (nm)
- MW: Molecular weight
- QY: Quantum yield
- BR: Brightness; Extinction coefficient * Quantum yield / 1000
- PS: Photostability; time to 50% brightness (sec)

References:

- Molecular Probes

- Molecular Probes Spectra Viewer
- GE Healthcare (CyDyes)
- Shaner NC, Steinbach PA, Tsien RY (2005). A guide to choosing fluorescent proteins. Nature Methods 2: 905-909
- Tsien Lab, UCSD
- Clontech
- Clontech FP overview
- Evrogen
- MBL International
- AECOM Flow Cytometry core
- Biostatus (DRAQ5)
- Others gathered over the years...
