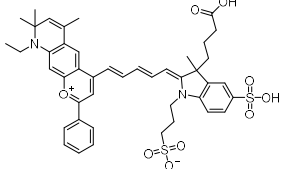
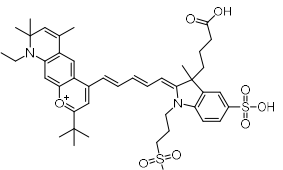
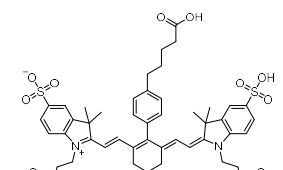
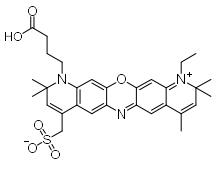
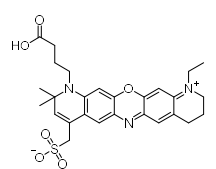


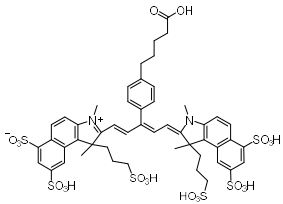
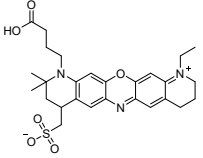
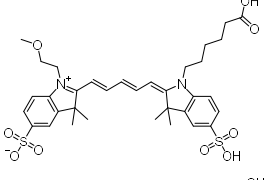
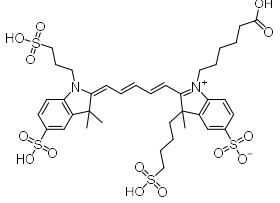
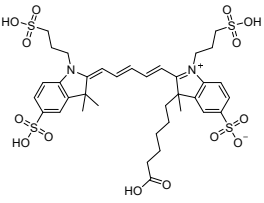
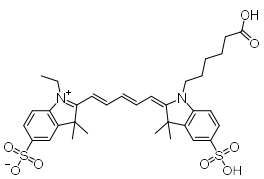
# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

**Table 1 Spectral properties of selected fluorescent dyes. ++: good, +: moderate, -: poor.**

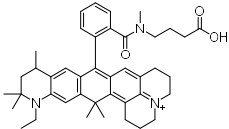
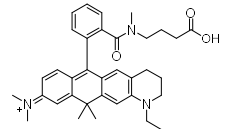
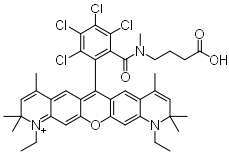
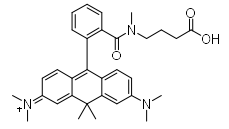
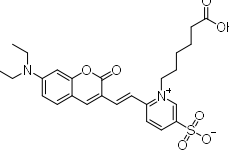
**Please note:** The choice of fluorophore not only depends on the available excitation source or filter sets but also on the final application.

Fluorescent Color	Dye	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [L*mmol <sup>-1</sup> *cm <sup>-1</sup> ]	Isomers	Notes/ Advantages
Near-IR	DY-776		813	771	793	120	pure	<u>Spectrally Similar Dyes:</u> IRDye® 800
	DY-751		793	751	779	270	pure	<u>Spectrally Similar Dyes:</u> Cy7, Alexa Fluor® 750, IRDye® 750, CF® 750, DyLight® 750
	IR750		1001	753	775	255	pure	<u>Spectrally Similar Dyes:</u> Cy7, Alexa Fluor® 750, IRDye® 750, CF® 750, DyLight® 750  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	ATTO 740	undisclosed	467	743	763	120	pure	<u>Spectrally Similar Dyes:</u> Cy7 <i>Hydrophilicity: +</i> <i>Photostability: ++</i>
Red	ATTO 700		566	700	716	120	pure	<u>Spectrally Similar Dyes:</u> Cy5.5 <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	ATTO 680		526	681	698	125	pure	<u>Spectrally Similar Dyes:</u> Cy5.5, IRDye® 700 <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>

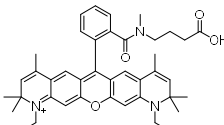
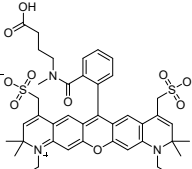
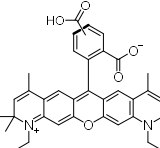
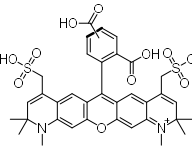
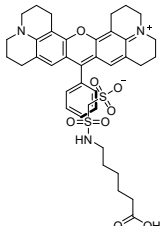
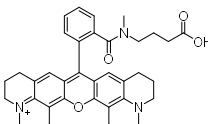
# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

Fluorescent Color	Dye	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [L <sup>*</sup> mmol <sup>-1</sup> cm <sup>-1</sup> ]	Isomers	Notes / Advantages
Red	<b>IR680LT</b>		1195	679	694	190	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 680, IRDye® 680RD, DyLight® 680, CF® 680  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	<b>ATTO 655</b>		528	663	680	125	two	<u>Spectrally Similar Dyes:</u> Cy5, Alexa Fluor® 647  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	<b>ATTO 665</b>	undisclosed	622	662	680	160	pure	<u>Spectrally Similar Dyes:</u> Cy5, Alexa Fluor® 647  <i>Hydrophilicity: -</i> <i>Photostability: ++</i>
	<b>DY-647P1</b>		687	653	670	250	pure	<u>Spectrally Similar Dyes:</u> Cy5, Alexa Fluor® 647
	<b>AF647</b> (also known as Alexa Fluor®647)		873	648	671	270	pure	<u>Spectrally Similar Dyes:</u> Cy5, Alexa Fluor® 647, CF® 647  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	<b>AF647A</b> (also known as Alexa Fluor®647)		859	648	671	270	pure	<u>Spectrally Similar Dyes:</u> Cy5, Alexa Fluor® 647, CF® 647  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	<b>Cy5</b>		657	649	670	250	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 647, ATTO 655, ATTO 647N  <i>Hydrophilicity: ++</i> <i>Photostability: -</i>

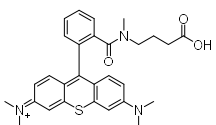
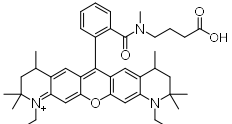
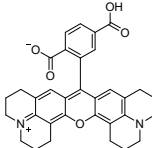
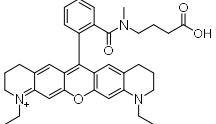
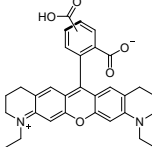
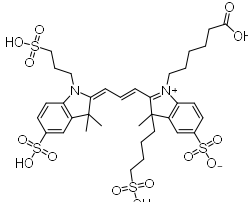
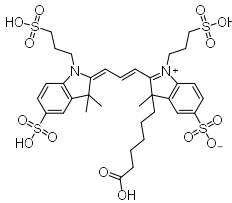
# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

Fluorescent Color	Dye	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [ $L^*mmol^{-1}cm^{-1}$ ]	Isomers	Notes / Advantages
Red	<b>ATTO 647N</b>		647	646	664	150	two	<u>Spectrally Similar Dyes:</u> Cy5, Alexa Fluor® 647, CF® 647  <i>Hydrophilicity: +</i> <i>Photostability: ++</i>
	<b>ATTO 643</b>	undisclosed	835	643	665	150	three	<u>Spectrally Similar Dyes:</u> ATTO 647N, Cy5, Alexa Fluor® 647, CF® 647  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	<b>STAR RED</b>	undisclosed	1029 <sup>[1]</sup>	638	655	120	pure	<u>Spectrally Similar Dyes:</u> ATTO 647N, Cy5, Alexa Fluor® 647, CF® 647  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	<b>ATTO 633</b>		553	630	651	130	pure	<u>Spectrally Similar Dyes:</u> ATTO 647N, Cy5, Alexa Fluor® 647, CF® 647  <i>Hydrophilicity: +</i> <i>Photostability: ++</i>
	<b>ATTO Rho14</b>		785	626	646	140	pure	<u>Spectrally Similar Dyes:</u> LightCycler® Red 640, Alexa Fluor® 633, CF®633  <i>Hydrophilicity: +</i> <i>Photostability: ++</i>
	<b>ATTO 620</b>		513	620	642	120	pure	<u>Spectrally Similar Dyes:</u> LightCycler® Red 640, CF®620R  <i>Hydrophilicity: +</i> <i>Photostability: ++</i>
	<b>DY-480XL</b>		515	500	630	50	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 610, Alexa Fluor® 594, ATTO 594

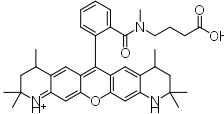
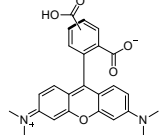
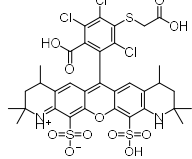
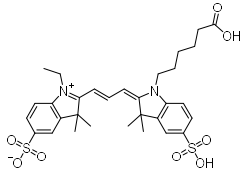
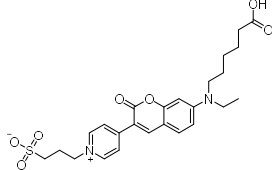
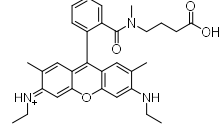
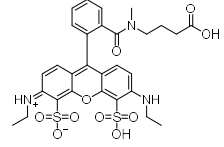
# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

Fluorescent Color	Dye	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [L <sup>*</sup> mmol <sup>-1</sup> cm <sup>-1</sup> ]	Isomers	Notes / Advantages
Orange	<b>ATTO Rho13</b>		647	603	627	120	pure	<u>Spectrally Similar Dyes:</u> ATTO 594, Alexa Fluor <sup>®</sup> 594, CF <sup>®</sup> 594, DyLight <sup>®</sup> 594, Texas Red  <i>Hydrophilicity: +</i> <i>Photostability: ++</i>
	<b>ATTO 594</b>		806	603	626	120	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor <sup>®</sup> 594, CF <sup>®</sup> 594, DyLight <sup>®</sup> 594, Texas Red  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	<b>ATTO 590</b>		591	593	622	120	two	<u>Spectrally Similar Dyes:</u> ATTO 594, Alexa Fluor <sup>®</sup> 594, CF <sup>®</sup> 594, DyLight <sup>®</sup> 594, Texas Red  <i>Hydrophilicity: +</i> <i>Photostability: ++</i>
	<b>AF594</b> (also known as Alexa Fluor <sup>®</sup> 594)		723	590	617	92	two	<u>Spectrally Similar Dyes:</u> ATTO 594, CF <sup>®</sup> 594, DyLight <sup>®</sup> 594, Texas Red  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	<b>Texas Red</b>		721	588	609	80	two	<u>Spectrally Similar Dyes:</u> ATTO 594, Alexa Fluor <sup>®</sup> 594, CF <sup>®</sup> 594, DyLight <sup>®</sup> 594  <i>Hydrophilicity: +</i> <i>Photostability: +</i>
	<b>ATTO Rho101</b>		591	587	609	120	pure	<u>Spectrally Similar Dyes:</u> ATTO 594, Alexa Fluor <sup>®</sup> 594, CF <sup>®</sup> 594, DyLight <sup>®</sup> 594, Texas Red  <i>Hydrophilicity: +</i> <i>Photostability: ++</i>
	<b>STAR 580</b>	undisclosed	800 <sup>[1]</sup>	587	607	85	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor <sup>®</sup> 594, Texas Red, CF <sup>®</sup> 594, DyLight <sup>®</sup> 594  <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>

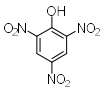
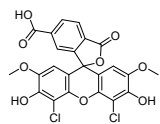
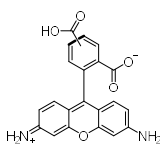
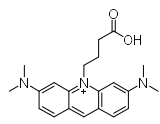
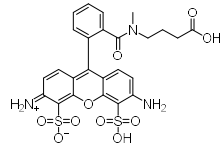
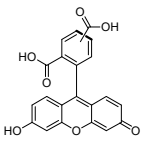
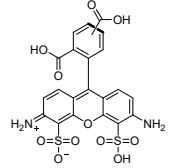
# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

Fluorescent Color	Dye	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [ $L^*mmol^{-1}cm^{-1}$ ]	Isomers	Notes / Advantages
Orange	<b>ATTO Thio12</b>		503	582	607	110	pure	<u>Spectrally Similar Dyes:</u> Texas Red  <i>Hydrophilicity:</i> + <i>Photostability:</i> ++
	<b>ATTO Rho12</b>		651	576	601	120	three	<u>Spectrally Similar Dyes:</u> ATTO Rho11, 6-ROX, ATTO 565, Alexa Fluor® 568, CF®575  <i>Hydrophilicity:</i> + <i>Photostability:</i> ++
	<b>6-ROX</b>		535	575	600	82	pure	<u>Spectrally Similar Dyes:</u> ATTO Rho12, ATTO Rho11, ATTO 565, Alexa Fluor® 568, CF®575
	<b>ATTO Rho11</b>		567	572	595	120	pure	<u>Spectrally Similar Dyes:</u> ATTO Rho12, 6-ROX, ATTO 565, Alexa Fluor® 568, CF®575  <i>Hydrophilicity:</i> + <i>Photostability:</i> ++
	<b>ATTO 565</b>		511	564	590	120	two	<u>Spectrally Similar Dyes:</u> ATTO Rho12, 6-ROX, ATTO Rho11, CF®570, Cy3.5  <i>Hydrophilicity:</i> + <i>Photostability:</i> ++
	<b>AF555</b> (also known as Alexa Fluor®555)		847	555	572	155	pure	<u>Spectrally Similar Dyes:</u> Cy3, ATTO 550, Alexa Fluor® 546, BODIPY® 558/568  <i>Hydrophilicity:</i> ++ <i>Photostability:</i> ++
	<b>AF555A</b> (also known as Alexa Fluor®555)		833	555	572	155	pure	<u>Spectrally Similar Dyes:</u> Cy3, ATTO 550, Alexa Fluor® 546, BODIPY® 558/568  <i>Hydrophilicity:</i> ++ <i>Photostability:</i> ++

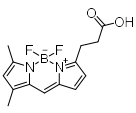
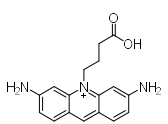
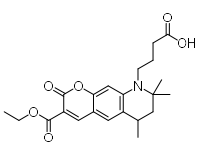
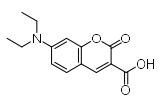
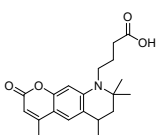
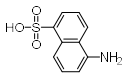

# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

Fluorescent Color	Dye	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [ $L \cdot mmol^{-1} \cdot cm^{-1}$ ]	Isomers	Notes / Advantages
Yellow	<b>ATTO 550</b>		595	554	576	120	three	<u>Spectrally Similar Dyes:</u> Cy3, Alexa Fluor® 555, BODIPY® 558/568, CF®550R, DyLight® 550, Rhodamine, TAMRA  <i>Hydrophilicity:</i> - <i>Photostability:</i> ++
	<b>5/6-TAMRA</b>		430	545	575	90	two <sup>[2]</sup>	<u>Spectrally Similar Dyes:</u> Cy3, Alexa Fluor® 546, BODIPY® 558/568, CF®550R, DyLight® 550, Rhodamine
	<b>AF546</b> (also known as Alexa Fluor®546)		848	554	570	110	pure	<u>Spectrally Similar Dyes:</u> Cy3, ATTO 550, Alexa Fluor® 555, BODIPY® 558/568, Rhodamine  <i>Hydrophilicity:</i> ++ <i>Photostability:</i> ++
	<b>Cy3</b>		631	550	570	150	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 555, ATTO 550, CF®550R, DyLight® 550, Rhodamine  <i>Hydrophilicity:</i> ++ <i>Photostability:</i> +
Yellow-Green	<b>DY-485XL</b>		503	485	560	50	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 532, ATTO 532, ATTO Rho6G, CF®532
	<b>ATTO Rho6G</b>		515	533	557	115	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 532, ATTO 532, DY-485XL, CF®532, BODIPY® 530/550  <i>Hydrophilicity:</i> + <i>Photostability:</i> ++
	<b>ATTO 532</b>		646	532	552	115	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 532, ATTO Rho6G, DY-485XL, CF®532, BODIPY® 530/550  <i>Hydrophilicity:</i> ++ <i>Photostability:</i> ++

# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

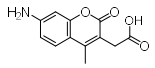
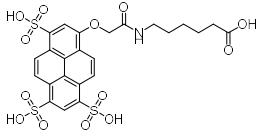

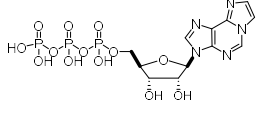
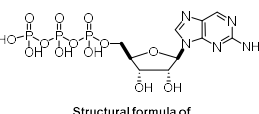
Fluorescent Color	Dye	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [ $L^*mmol^{-1}cm^{-1}$ ]	Isomers	Notes / Advantages
Yellow-Green	<b>TNP</b> (also known as Picric acid)		229	470	552	18.5	pure	Historically the first fluorescent analogs used as substrates for G-proteins and ATP binding proteins. Also available as pyrimidine probes.
	<b>6-JOE</b>		505	520	548	75	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 532, ATTO 532, CF®532, BODIPY® 530/550, VIC®, HEX
Green	<b>5/6-Rhodamine</b>		374	505	530	85	two	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 488, ATTO 488, ATTO 495, Fluorescein
	<b>ATTO 495</b>		352	498	526	80	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 488, ATTO 488, Rhodamine, Fluorescein <i>Hydrophilicity: +</i> <i>Photostability: ++</i>
	<b>ATTO 488</b>		590	500	520	90	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 488, Fluorescein, Rhodamine, DyLight® 488, CF®488A <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>
	<b>5/6-Fluorescein</b>		376	492	517	83	two <sup>[2]</sup>	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 488, ATTO 488, Rhodamine, DyLight® 488, CF®488A <i>Hydrophilicity: +</i> <i>Photostability: -</i>
	<b>AF488</b> (also known as Alexa Fluor®488)		534	494	515	73	two	<u>Spectrally Similar Dyes:</u> ATTO 488, Fluorescein, Rhodamine, DyLight® 488, CF®488A <i>Hydrophilicity: ++</i> <i>Photostability: ++</i>

# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

Fluorescent Color	Dye	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [L*mmol <sup>-1</sup> *cm <sup>-1</sup> ]	Isomers	Notes / Advantages
Green	<b>BDP-FL</b> (also known as BODIPY®FL)		292	503	512	80	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 488, ATTO 488, Fluorescein, Rhodamine, DyLight® 488, CF®488A  <i>Hydrophilicity:</i> - <i>Photostability:</i> ++
Blue-Green	<b>ATTO 465</b>		296	453	506	75	pure	<u>Spectrally Similar Dyes:</u> Cyan 500, ATTO 425  <i>Hydrophilicity:</i> + <i>Photostability:</i> ++
	<b>ATTO 425</b>		401	439	485	45	pure	<u>Spectrally Similar Dyes:</u> DEAC, ATTO 465  <i>Hydrophilicity:</i> + <i>Photostability:</i> ++
Blue	<b>DEAC</b> (free acid)		261	426	480	57	pure	
	<b>ATTO 390</b>		343	390	476	24	pure	<i>Hydrophilicity:</i> + <i>Photostability:</i> ++
	<b>AmNS</b> (also known as Laurent acid)		223	323	461	4.2	pure	
	<b>MANT</b>		151	355	448	5.8	pure	"THE CLASSICS" for small GTPases, heterotrimeric G-proteins, GPCRs, and motor protein kinetics. Small MW and environmentally sensitive fluorescence. FRET-probe for protein-intrinsic Tyr and Trp residues.



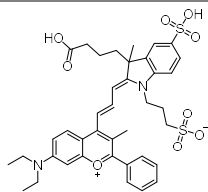
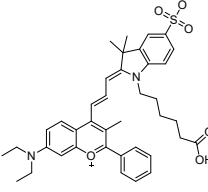
# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

Fluorescent Color	Dye	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [ $L^*mmol^{-1}cm^{-1}$ ]	Isomers	Notes / Advantages
	<b>AMCA</b> (free acid)		233	350	450	19	pure	<u>Spectrally Similar Dyes:</u> Alexa Fluor® 350, CF®350, DyLight® 350
	<b>AF405</b> (also known as Alexa Fluor®405)		630	402	424	33	pure	<u>Spectrally Similar Dyes:</u> DyLight® 405  <i>Hydrophilicity: ++</i> <i>Photostability: +</i>
	<b>ANT</b>		137	332	423	4.6	pure	Substitute for Mant-probes. Specific for tubulin, dynein, CaM, and disulfide isomerase. FRET-probe for protein-intrinsic Tyr and Trp residues.
	<b>Etheno-AMP/ADP/ATP</b>	 Structural formula of $\epsilon$ -ATP	-	300	415	6.0	pure	Commonly used substrate of motor proteins, kinases, and other ATP binding proteins.
	<b>2-Aminopurine-ribose-triphosphate</b>	 Structural formula of 2-Aminopurine-ribose-5'-triphosphate	-	305	370	8.0	pure	Fluorescent analog of ATP and/or GTP.

# Properties of Fluorescent Dyes, Fluorescent Quencher & Redox Label

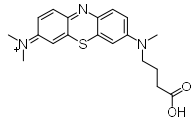
**Table 2 Spectral properties of selected fluorescent quencher. ++: good, +: moderate, -: poor.**

**Please note:** It is important that the emission peak of the fluorescent dye and the absorption peak of the quencher have a large overlap range that ensures efficient resonant energy transfer and thus efficient quenching.

Fluorescent Color	Quencher	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [ $L^*mmol^{-1}cm^{-1}$ ]	Isomers	Notes/ Advantages
-	<b>DYQ-661</b>		749	662	-	104	pure	
	<b>DYQ-660</b>		669	660	-	109	pure	
	<b>ATTO 612Q</b>	undisclosed	690	615	-	115	two	Hydrophilicity: + Photostability: ++
	<b>ATTO 580Q</b>	undisclosed	694	587	-	110	six	Hydrophilicity: + Photostability: ++
	<b>ATTO 540Q</b>	undisclosed	558	543	-	105	two	Hydrophilicity: + Photostability: ++

**Table 3 Spectral properties of selected fluorescent quencher. ++: good, +: moderate, -: poor.**

**Please note:** ATTO MB2 is a variant of the well-known redox dye methylene blue that can be coupled to biomolecules. This dye can be reversibly converted into a colourless leuco form by enzymatic reduction.

Fluorescent Color	Redox Label	Structure	MW (free acid) [g/mol]	$\lambda_{exc}$ [nm]	$\lambda_{em}$ [nm]	$\epsilon$ [ $L^*mmol^{-1}cm^{-1}$ ]	Isomers	Notes/ Advantages
Blue	<b>ATTO MB2</b>		356	668	-	100	pure	Hydrophilicity: +

<sup>[1]</sup> MW of the NHS ester

<sup>[2]</sup> also available as single isomer