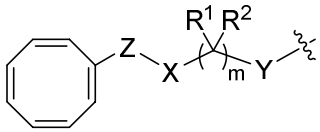
CLAIMS

1. A fluorescent compound comprising a photo-protecting cyclooctatetraene moiety, wherein the photo-protecting cyclooctatetraene moiety consists of the structure of formula (I):



(I)

wherein:

both R^1 and R^2 are H, or wherein R^1 is H and R^2 is amino or carboxyl;

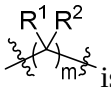
X is -C(=O)-NR^4-;

Y is -NR^3- or -C(=O)-O-;

Z is absent;

R^3 is H or optionally substituted C_{1-6} alkyl;

R^4 is H;

the carbon atom to which R^1 and R^2 are attached in 

is optionally replaced with O, S, or N, provided that when said carbon atom is replaced with O or S, then R^1 and R^2 are both absent; when said carbon atom is replaced with N, then R^2 is absent; and

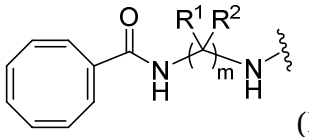
m is an integral number between 0 and 6;

provided that the fluorescent compound is not a cyanine dye, and wherein the fluorescent compound is excitable by a light source having a wavelength between about 350 nm to about 500 nm.

2. The fluorescent compound of Claim 1, wherein Y is -NR^3- and R^3 is H.

3. The fluorescent compound of Claim 1, wherein Y is -NR^3- and R^3 is C_{1-6} alkyl substituted with amino, carboxyl, -SO_3H, -SO_3^-, –O-SO_3^-, -C(O)OR^5, or -C(O)NR^6R^7.

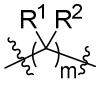
4. The fluorescent compound of Claim 1, wherein the photo-protecting moiety consists of the structure of formula (Ia):


(Ia).

5. The fluorescent compound of any one of Claims 1 to 4, wherein at least one of R^1 and R^2 is hydrogen.

6. The fluorescent compound of any one of Claims 1 to 5, wherein both R^1 and R^2 is hydrogen.

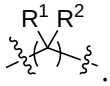
7. The fluorescent compound of any one of Claims 1 to 5, wherein R^1 is H and R^2 is amino or carboxyl.

8. The fluorescent compound of any one of Claims 1 to 5, wherein at least one carbon atom to which R^1 and R^2 are attached in  is replaced with O, S, or N.

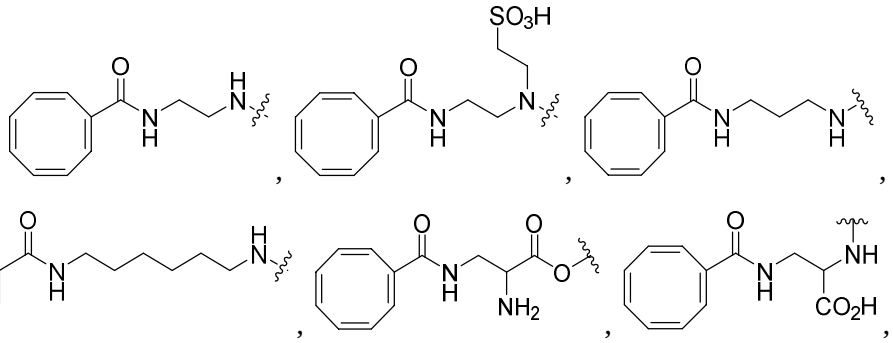
9. The fluorescent compound of any one of Claims 4 to 8, wherein m is 1, 2, 3, 4, 5, or 6.

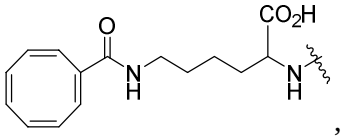
10. The fluorescent compound of any one of Claims 1 to 4, wherein m is 2, 3, 4, 5 or 6, and each one of R^1 and R^2 is hydrogen.

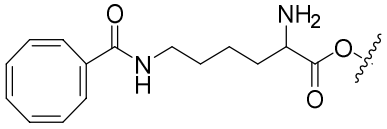
11. The fluorescent compound of any one of Claims 1 to 4, wherein m is 2, 3, 4, 5, or 6 wherein each of R^1 and R^2 is hydrogen in  ; and wherein R^1 is H, and R^2 is amino or carboxyl

in the remaining .

12. The fluorescent compound of Claim 1, wherein the photo-protecting moiety consists of the structure:





, or 

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13. The fluorescent compound of any one of Claims 1 to 12, wherein the fluorescent compound is excitable by a light source having a wavelength between about 350 nm and about 500 nm, or between about 420 nm and about 480 nm.

14. The fluorescent compound of Claim 13, wherein the fluorescent compound is excitable by a light source having a wavelength between about 450 nm and about 460 nm.

15. A nucleoside, nucleotide or oligonucleotide labeled with a fluorescent compound of any one of Claims 1 to 14.

16. A method of protecting a fluorescent dye from photobleaching, comprising covalently attaching the fluorescent dye to a photo-protecting cyclooctatetraene moiety, wherein the photo-protecting cyclooctatetraene moiety consists the structure of formula (I) according to any one of Claims 1 to 14.

17. A method of protecting a nucleoside or nucleotide from light-induced degradation, comprising covalently attaching the nucleoside or nucleotide to a fluorescent compound of any one of Claims 1 to 14.

18. A method of reducing or preventing light-induced degradation of nucleic acids during a nucleic acid sequencing reaction, comprising:

(a) incorporating a nucleotide into a copy polynucleotide strand complementary to at least a portion of a template polynucleotide strand, wherein the nucleotide comprises a 3’ blocking group and is labeled with a fluorescent compound of any one of Claims 1 to 14;

(b) detecting the identity of the nucleotide incorporated into the copy strand in the presence of a first buffer composition;

(c) chemically removing the label and the 3’ blocking group from the nucleotide incorporated into the copy polynucleotide strand; and

(d) washing the chemically removed label and the 3’ blocking group away from the copy strand with a wash solution.

19. The method of Claim 18, wherein the wash solution comprises the first buffer solution.

20. The method of Claim 19, further comprising repeating steps (a) to (d) until a sequence of the portion of the template polynucleotide strand is determined.

21. The method of Claim 20, wherein the steps (a) to (d) is repeated at least 50 times.

22. The method of any one of Claims 18 to 21, wherein step (b) comprises irradiating the copy polynucleotide strand incorporated with the nucleotide with a light source in the presence of the first buffer composition.

23. The method of Claim 22, wherein the light source has a wavelength from about 400 nm to about 500 nm.

24. The method of any one of Claims 18 to 23, wherein removing the label and the 3’ blocking group from the nucleotide incorporated into the copy polynucleotide strand comprises contacting the copy strand with a phosphine.

25. The method of Claim 24, wherein the phosphine is tris(hydroxymethyl)phosphine, tris(2-hydroxyethyl)phosphine or tris(hydroxypropyl)phosphine.

26. The method of any one of Claims 18 to 25, wherein the nucleotide is a nucleotide triphosphate.

27. The method of any one of Claims 18 to 26, wherein the first buffer composition comprises ascorbic acid or a salt thereof.

28. The method of any one of Claims 18 to 25, wherein the template polynucleotide strand is attached to a solid support.

29. The method of Claim 28, wherein the template polynucleotide is attached to a flow cell.

30. A kit for use with a sequencing apparatus, comprising a plurality of chambers containing a plurality of compositions, wherein each chamber contains a single composition, wherein the plurality of compositions comprise:

reagents for incorporating a nucleotide into a copy polynucleotide strand complementary to at least a portion of a template polynucleotide strand, wherein the nucleotide comprises a 3’ blocking group and is labeled with a fluorescent compound of any one of Claims 1 to 14;

a buffer composition comprising at least one antioxidant;

reagents for chemically removing a label and blocking moiety from the blocked, labeled nucleotide incorporated into the copy strand; and

a wash solution.

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