What is claimed:

1. A polypeptide having at least 80% sequence identity to SEQ ID NO: 1 comprising amino acid substitutions relative to SEQ ID NO: 3 at positions corresponding to positions 18, 54, 68, 72, 75, and 90 of SEQ ID NO: 1, wherein the polypeptide has enhanced luminescence relative to SEQ ID NO: 3.

2. The polypeptide of claim 1, wherein the amino acid at position 18 is leucine, at position 54 is isoleucine or alanine, at position 68 is aspartate or tyrosine, at position 72 is glutamine, at position 75 is lysine, and at position 90 is valine.

3. The polypeptide of claim 1, further comprising amino acid substitutions relative to SEQ ID NO: 3 at positions 27, 33, and 43 of SEQ ID NO: 1.

4. The polypeptide of claim 3, wherein the amino acid at position 27 is valine, glycine, or isoleucine, at position 33 is alanine, lysine, or asparagine, and at position 43 is lysine or arginine.

5. The polypeptide of claim 1, further comprising amino acid substitutions relative to SEQ ID NO: 3 at positions 11, 44, 115, 124, and 138 of SEQ ID NO: 1.

6. The polypeptide of claim 5, wherein the amino acid at position 11 is glutamine, at position 44 is valine, at position 115 is proline, at position 124 is glutamine, and at position 138 is tyrosine.

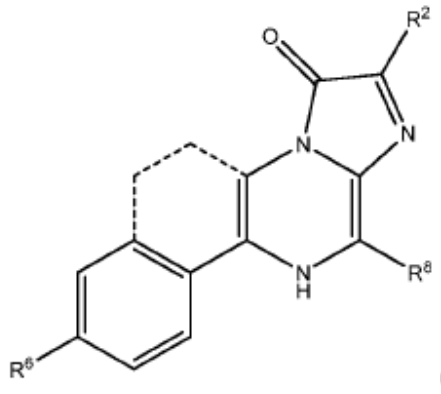
7. The polypeptide of claim 1, further comprising amino acid substitutions relative to SEQ ID NO: 3 at positions 11, 27, 33, 43, 44, 115, 124, and 138 of SEQ ID NO: 1.

8. The polypeptide of claim 7, wherein the amino acid at position 11 is glutamine, at position 27 is valine, glycine, or isoleucine, at position 33 is alanine, lysine, or asparagine, at position 43 is lysine or arginine at position 44 is valine, at position 115 is proline, at position 124 is glutamine, and at position 138 is tyrosine.

9. A fusion protein comprising the polypeptide of claim 1 and a polypeptide of interest.

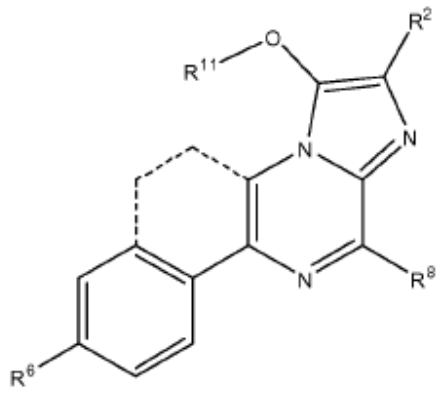
10. A kit comprising the polynucleotide of claim 1.

11. The kit of claim 10, further comprising at least one of: (a) the compound of formula (Ia) or (Ib):



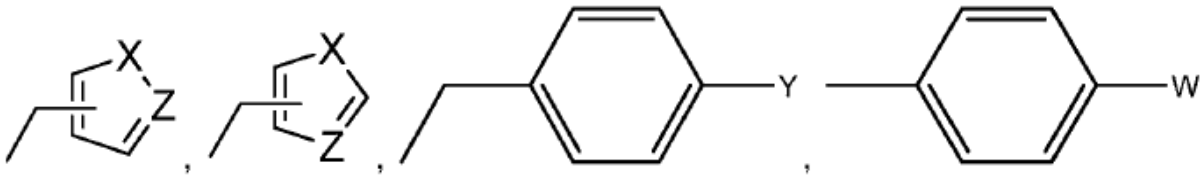
(Ia)

or



(Ib)

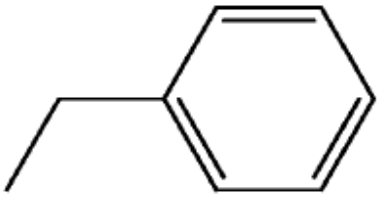
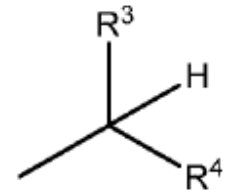
wherein R^2 is selected from the group consisting of



or C_{2-5} straight chain alkyl;

R^6 is selected from the group consisting of --H, --OH, --NH_2, --OC(O)R or --$OCH_2OC(O)R$;

R^8 is selected from the group consisting of


, 

, H or lower cycloalkyl;

wherein R^3 and R^4 are both H or both C_{1-2} alkyl;

W is --NH_2, halo, --OH, --NHC(O)R, --CO_2R;

X is --S--, --O-- or --NR^{22}--;

Y is --H, --OH, or --OR^{11};

Z is --CH-- or --N--;

each $R^{11}$is independently --C(O)R" or --$CH_2OC(O)R$";

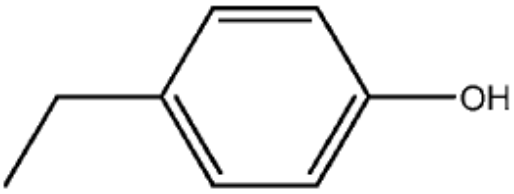
R^{22} is H, CH_3 or CH_2CH_3;

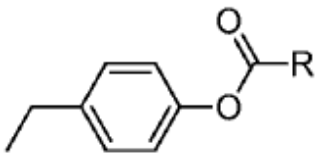
each R is independently C_{1-7} straight-chain alkyl or C_{1-7} branched alkyl;

R" is C_{1-7} straight-chain alkyl or C_{1-7} branched alkyl;

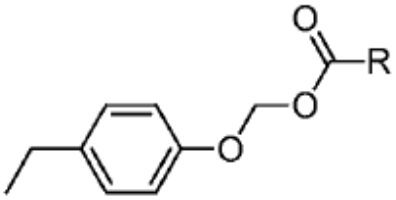
the dashed bonds indicate the presence of an optional ring, which may be saturated or unsaturated;

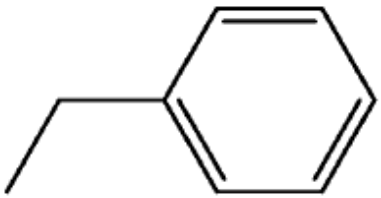
with the proviso that when R^2 is

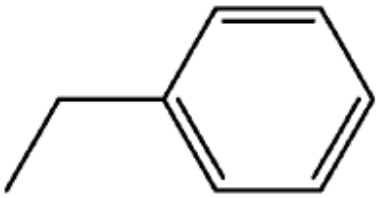


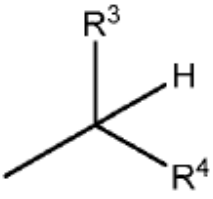
, 

, or

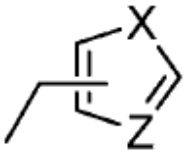


, R^8 is not 
;

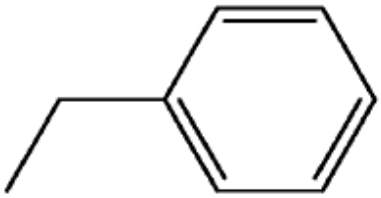
with the proviso that when R^2 is ,



R^8 is or lower cycloalkyl;

and with the proviso that when R^6 is NH_2, R^2 is, 

or $C_{2\text{-}5}$ alkyl;

or R^8 is not  ; and

(b) a buffer reagent.