CLAIMS

1. An isolated polynucleotide encoding variant 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 11, 18, 27, 33, 43, 44, 54, 68, 72, 75, 90, 115, and 124 of SEQ ID NO: 1, wherein the polypeptide has enhanced luminescence relative to SEQ ID NO: 3.

2. The polynucleotide of claim 1, wherein the amino acid at position 54 is isoleucine or alanine and at position 90 is valine.

3. The polynucleotide of claim 1, wherein the amino acid at position 18 is leucine, at position 68 is tyrosine, at position 72 is glutamine and at position 75 is lysine.

4. The polynucleotide of claim 1, wherein the amino acid at position 33 is asparagine, at position 27 is valine, at position 43 is arginine and at position 68 is aspartate.

5. The polynucleotide of claim 1 wherein the at least one amino acid substitution corresponds to at least one of glutamine at position 11, valine at position 44, proline at position 115, glutamine at position 124, or tyrosine at position 138 corresponding to SEQ ID NO: 1.

6. The polynucleotide of claim 1, comprising an amino acid substitution selected from the following group: the amino acid at position 27 is glycine or isoleucine, the amino acid at position 33 is lysine or alanine, and the amino acid at position 43 is lysine.

7. The polynucleotide of claim 1, wherein the sequence has been codon-optimized for a host cell.

8. A polynucleotide encoding a fusion protein comprising the polynucleotide of claim 1 and a nucleic acid encoding a polypeptide of interest.

9. A vector comprising the polynucleotide, or a fragment thereof, of claim 1.

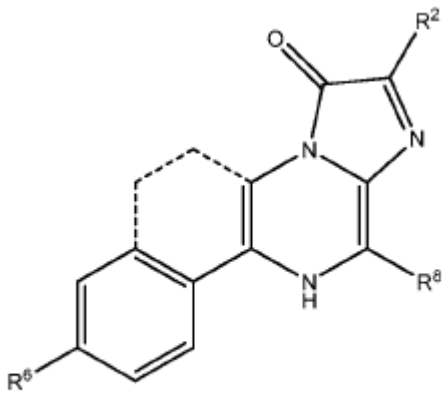
10. The vector of claim 9, wherein the polynucleotide is operably linked to a promoter.

11. An isolated cell comprising the polynucleotide of claim 1.

12. A non-human cell comprising the polynucleotide of claim 1.

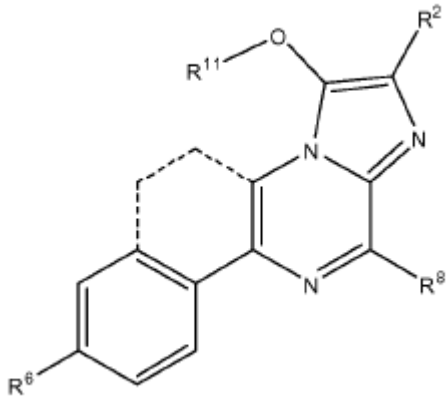
13. A kit comprising the polynucleotide of claim 1.

14. The kit of claim 13, further comprising at least one of: (a) the compound of formula (Ia) or (Ib):



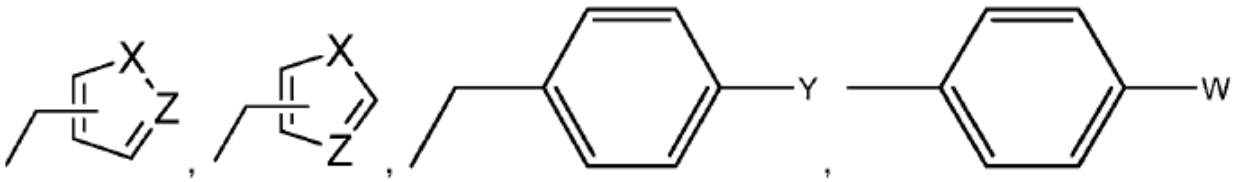
(Ia)

or

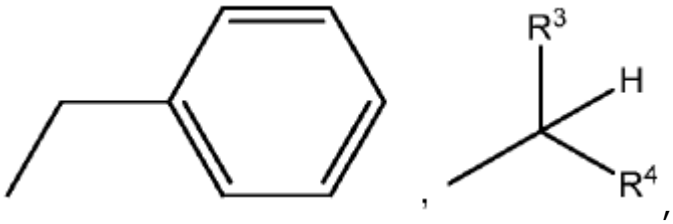


(Ib)

wherein R^2 is selected from the group consisting of

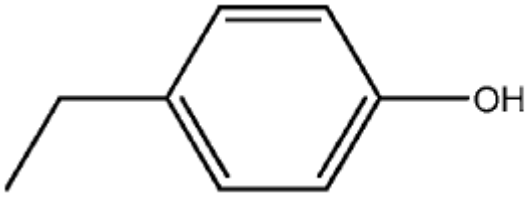


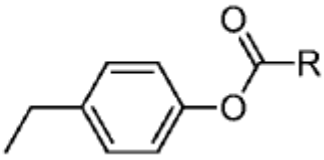
or $C_{2\text{-}5}$ straight chain alkyl;
R^6 is selected from the group consisting of --H, --OH, --NH_2, --OC(O)R or --$OCH_2OC(O)R$;
R^8 is selected from the group consisting of



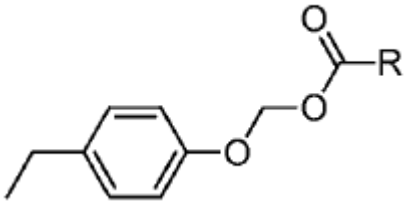
, H or lower cycloalkyl;
wherein R^3 and R^4 are both H or both $C_{1\text{-}2}$ alkyl;
W is --NH_2, halo, --OH, --NHC(O)R, --CO_2R;
X is --S--, --O-- or --NR^{22}--;
Y is --H, --OH, or --OR^{11};
Z is --CH-- or --N--;

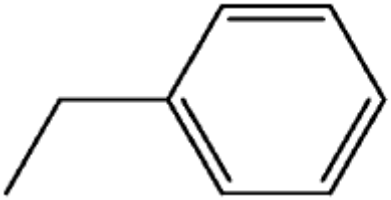
each $R^{11}$is independently --C(O)R'' or --$CH_2OC(O)R''$;
R^{22} is H, CH_3 or CH_2CH_3;
each R is independently C_{1-7} straight-chain alkyl or C_{1-7} branched alkyl;
R'' is C_{1-7} straight-chain alkyl or C_{1-7} branched alkyl;
the dashed bonds indicate the presence of an optional ring, which may be saturated or unsaturated;
with the proviso that when R^2 is

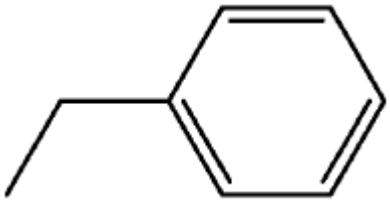


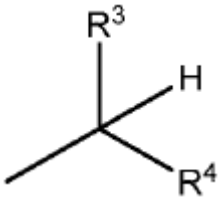
,


, or

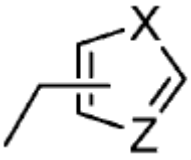


, R^8 is not

;

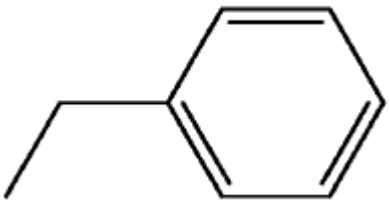
with the proviso that when R^2 is

,

R^8 is


or lower cycloalkyl;

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


or C_{2-5} alkyl;

or R^8 is not

; and

(b) a buffer reagent.