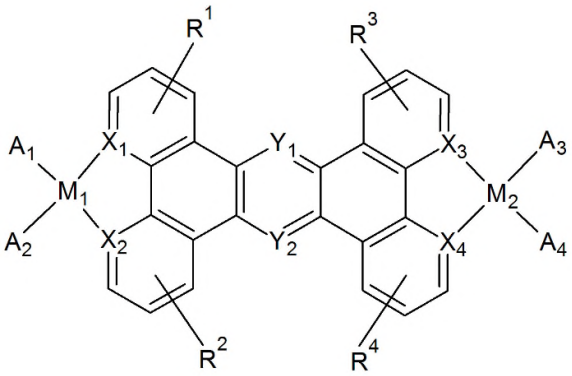
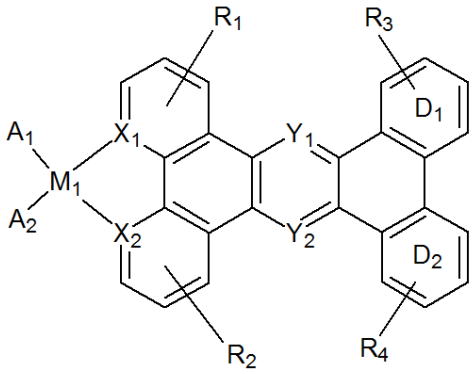
**Claims**

1. A compound according to formula (I) or formula (Ia):




formula (I)




formula (Ia)

wherein,

$X_1$, $X_2$, $X_3$ and $X_4$ are each independently selected from: N~~, O, S~~;

$Y_1$ and $Y_2$ are each independently selected from: N~~, O, S,~~ or C($R_a$);

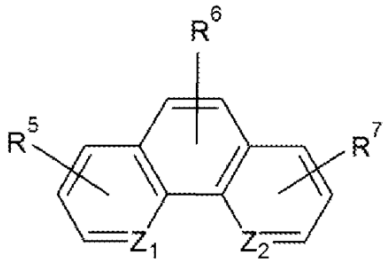
$M_1$ and $M_2$ are each a metal centre, wherein $M_1$ and $M_2$ are each ruthenium;

$R_1$, $R_2$, $R_3$, $R_4$ and $R_a$ are each independently selected from: hydrogen, alkyl, alkenyl, aryl, halogen, haloalkyl, haloalkenyl, haloaryl, hydroxy, alkoxy, carboxylic acid, amino, amido, nitro or combination thereof;

$A_1$, $A_2$, $A_3$ and $A_4$ are each bidentate ligands; and

rings $D_1$ and $D_2$ ~~are~~ each independently comprise one or more heteroatoms selected from N, O, S, C($R_a$);

wherein the bidentate ligand is a compound according to formula (III):




formula (III)

wherein,

$Z_1$ and $Z_2$ are each N; and

$R_5$, $R_6$, and $R_7$ are each independently selected from: hydrogen, alkyl, alkenyl, aryl, halogen, haloalkyl, haloalkenyl, haloaryl, hydroxy, alkoxy, carboxylic acid, amino, amido, nitro or combinations thereof.

~~wherein said compound is for use as an antimicrobial.~~

2. A compound for use according to claim 1, wherein the compound is for use as an antibiotic.

3. A compound for use according to claim 2, wherein the compound is for use against gram-negative bacteria.

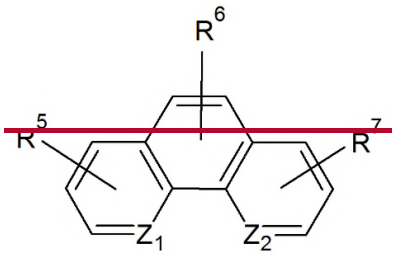
~~4. A compound according to any of claim 1 to 3, wherein $X_1$, $X_2$, $X_3$ and $X_4$ are each N.~~

~~5.~~4. A compound for use according to any preceding claim, wherein $Y_1$ and $Y_2$ are each N.

~~6. A compound according to any preceding claim, wherein $M_1$ and $M_2$ are each ruthenium.~~

~~7.~~5. A compound for use according to any preceding claim, wherein $R_1$, $R_2$, $R_3$, $R_4$ and $R_a$ are each independently selected from: hydrogen, alkyl and aryl.

~~8. A compound according to any preceding claim, wherein the bidentate ligand is a compound according to formula (III):~~




~~formula (III)~~

~~wherein,~~

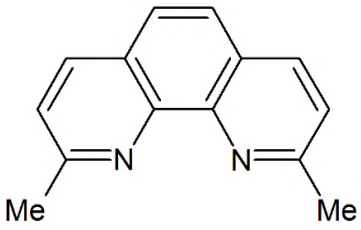
~~$Z_1$ and $Z_2$ are each independently selected from: N, O, S; and~~

~~$R_5$, $R_6$, and $R_7$ are each independently selected from: hydrogen, alkyl, alkenyl, aryl, halogen, haloalkyl, haloalkenyl, haloaryl, hydroxy, alkoxy, carboxylic acid, amino, amido, nitro or combination thereof.~~

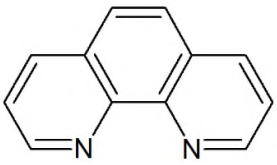
~~9.~~6. A compound for use according to any preceding claim ~~8~~, wherein $R_5$, $R_6$, and $R_7$ are each independently selected from: hydrogen, alkyl and aryl.

~~10. A compound according to claim 8 or claim 9, wherein $Z_1$ and $Z_2$ are each N.~~

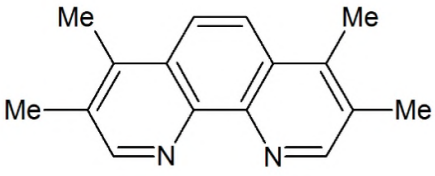
~~11.~~7. A compound for use according to any preceding claim, wherein $A_1$, $A_2$, $A_3$ and $A_4$ are each bidentate ligands independently selected from **(1)** to **(7)**:



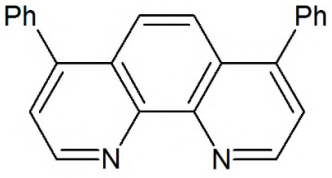

**(1)**



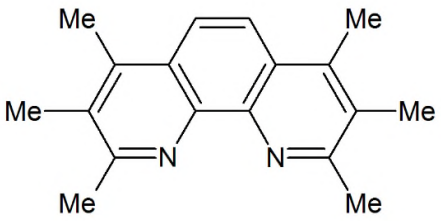

**(2)**



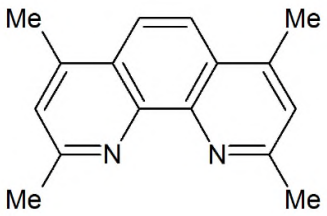

**(3)**



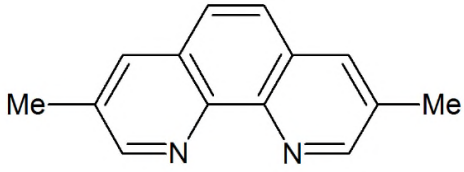

**(4)**



**(5)**



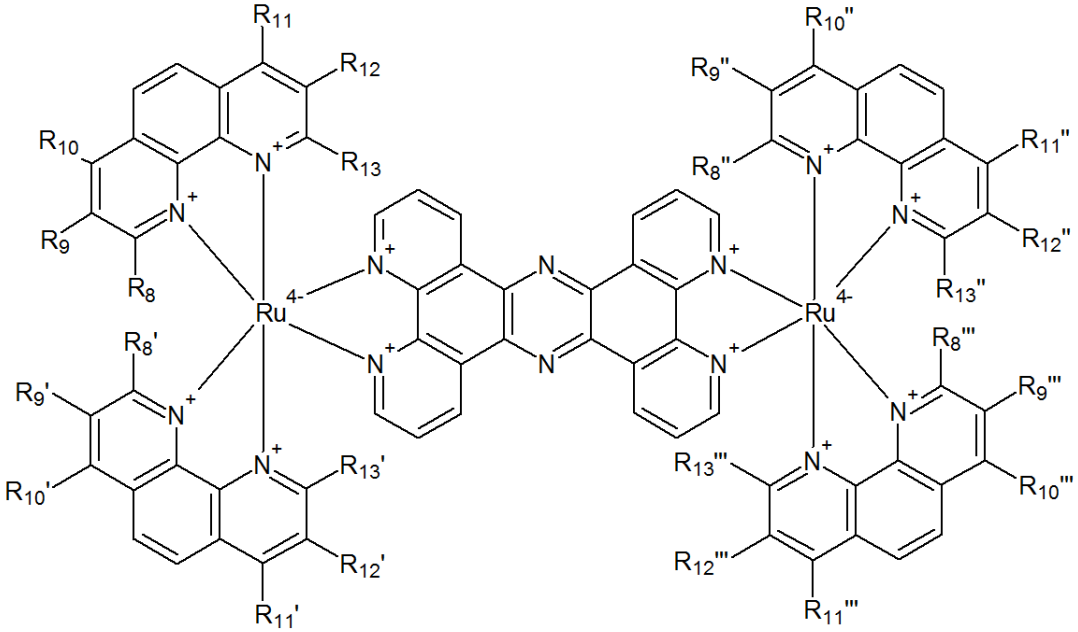
**(6)**



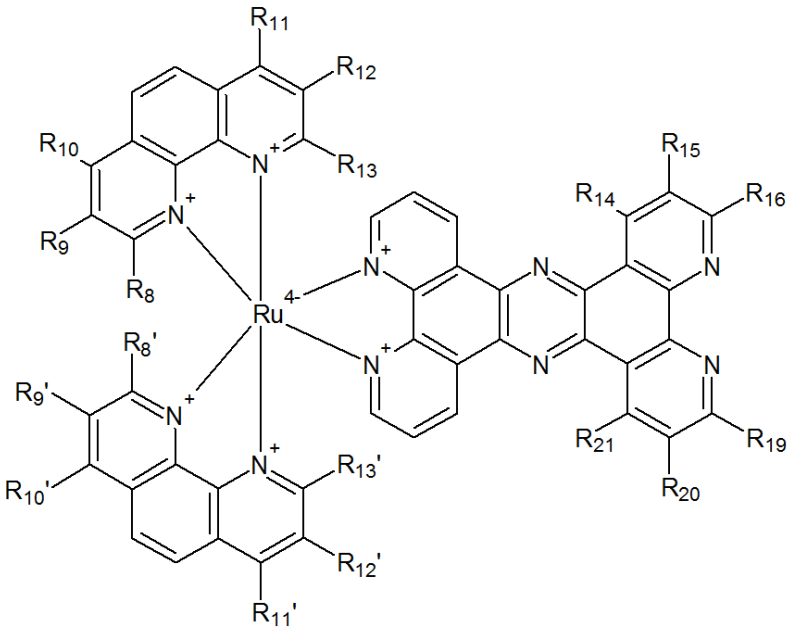
**(7)**

or combination thereof.

~~12.~~8. A compound for use according to any preceding claim, having a structure according to formula (IV) or (IVa):



formula (IV)




formula (IVa)

wherein

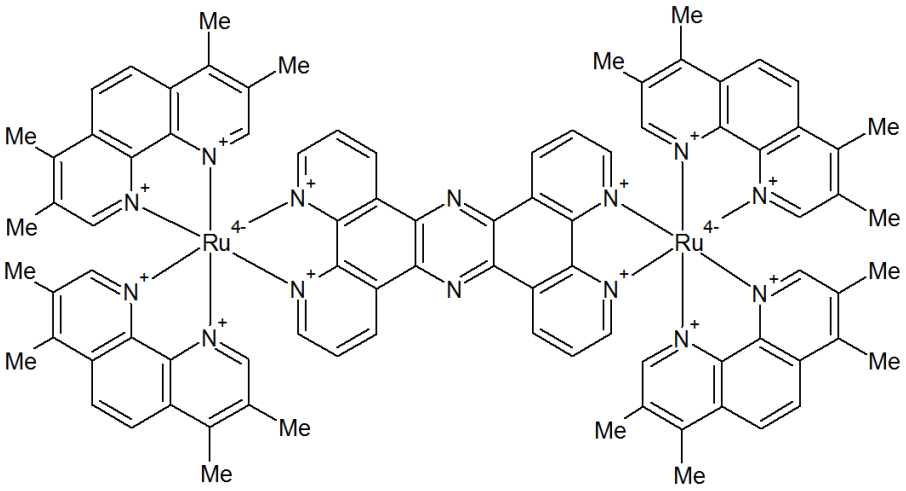
$R_8$, $R_8'$, $R_8''$, $R_8'''$, $R_9$, $R_9'$, $R_9''$, $R_9'''$, $R_{10}$, $R_{10}'$, $R_{10}''$, $R_{10}'''$, $R_{11}$, $R_{11}'$, $R_{11}''$, $R_{11}'''$, $R_{12}$, $R_{12}'$, $R_{12}''$, $R_{12}'''$, $R_{13}$, $R_{13}'$, $R_{13}''$ and $R_{13}'''$ are each independently selected from: hydrogen, alkyl, alkoxy, alkenyl and aryl;

with the proviso that at least one of $R_8$, $R_8'$, $R_8''$, $R_8'''$, $R_9$, $R_9'$, $R_9''$, $R_9'''$, $R_{10}$, $R_{10}'$, $R_{10}''$, $R_{10}'''$, $R_{11}$, $R_{11}'$, $R_{11}''$, $R_{11}'''$, $R_{12}$, $R_{12}'$, $R_{12}''$, $R_{12}'''$, $R_{13}$, $R_{13}'$, $R_{13}''$ and $R_{13}'''$ is selected from: alkyl, alkoxy, alkenyl and aryl; and

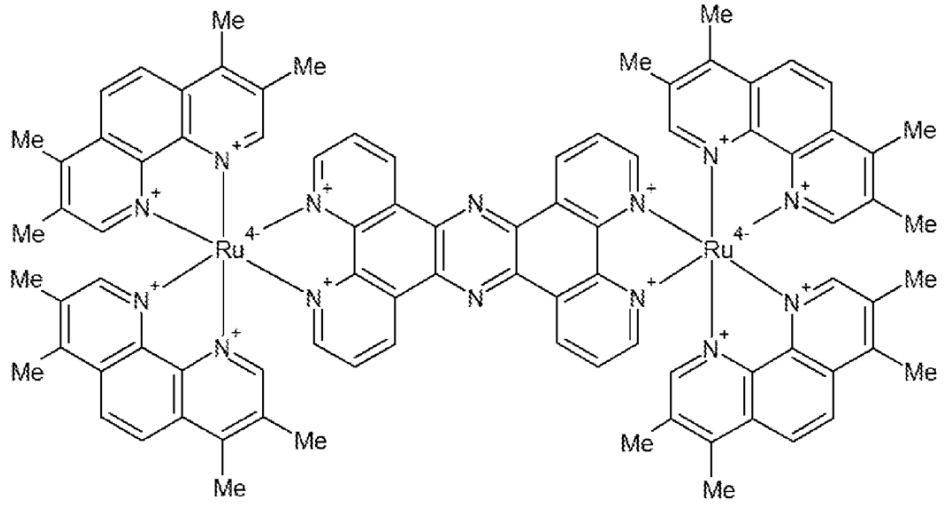
wherein $R_{14}$, $R_{15}$, $R_{16}$, $R_{17}$, $R_{18}$, $R_{19}$, $R_{20}$ and $R_{21}$ are each independently selected from: hydrogen, alkyl, alkenyl, aryl, halogen, hydroxy, alkoxy or combinations thereof.

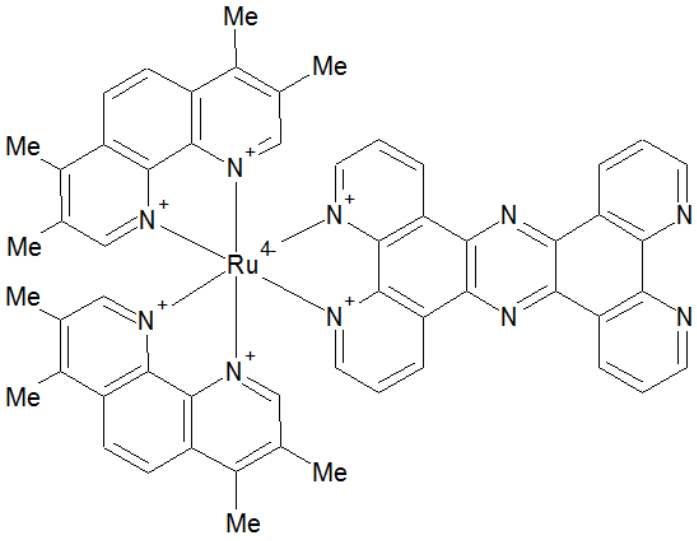
~~13.~~9. A compound for use according to claim ~~12~~8, wherein: $R_8$, $R_8'$, $R_8''$ and $R_8'''$ are identical; $R_9$, $R_9'$, $R_9''$ and $R_9'''$ are identical; $R_{10}$, $R_{10}'$, $R_{10}''$ and $R_{10}'''$ are identical; $R_{11}$, $R_{11}'$, $R_{11}''$ and $R_{11}'''$ are identical; $R_{12}$, $R_{12}'$, $R_{12}''$ and $R_{12}'''$ are identical; and $R_{13}$, $R_{13}'$, $R_{13}''$ and $R_{13}'''$ are identical.

~~14.~~10. A compound for use according to claim ~~12~~8 or ~~13~~9, having a structure according to formula (V) or formula (Va):



formula (V)





formula (Va)

or pharmaceutically acceptable salt thereof.

~~15.~~11. A composition comprising the compound for use according to any preceding claim.

~~16.~~12. A composition according to claim ~~15~~11, for use as an antimicrobial.