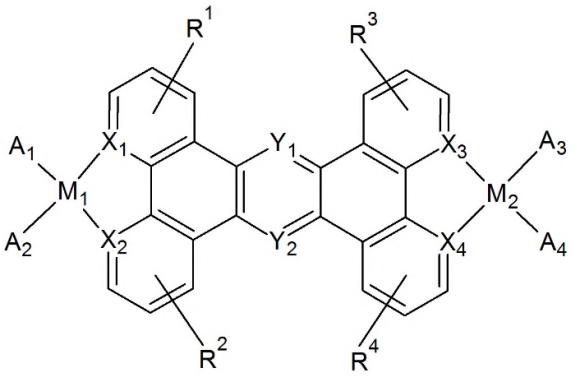
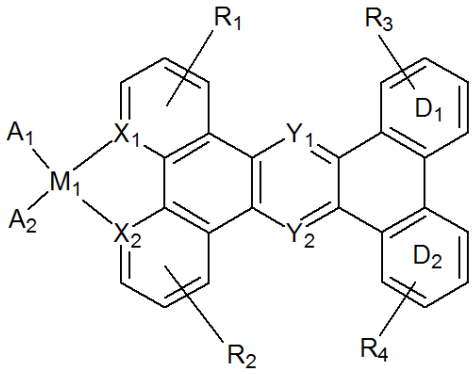
Claims

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;

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

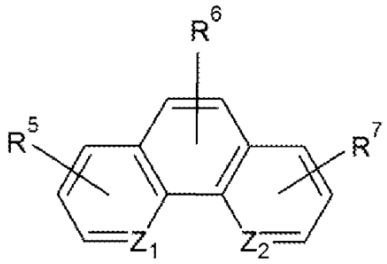
M_1 and M_2 are each a metal centre, wherein M_1 and M_2 are each ruthenium;

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 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.

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

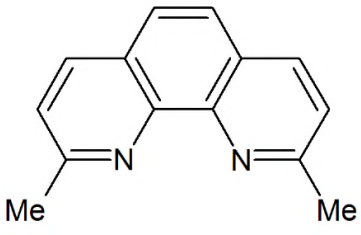
3. A compound for use according to claim 2, wherein the compound is for use against gram-negative bacteria.

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

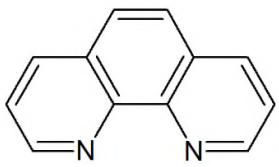
5. A compound for use according to any preceding claim, wherein R_1, R_2, R_3, R_4 and R_a are each independently selected from: hydrogen, alkyl and aryl.

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

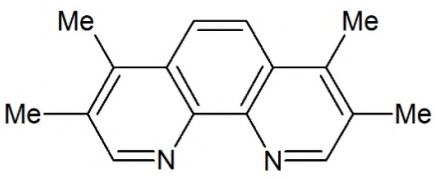
7. A compound for use according to any preceding claim, wherein A_1, A_2, A_3 and A_4 are each bidentate ligands independently selected from **(1)** to **(7)**:



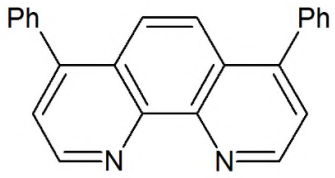
(1)



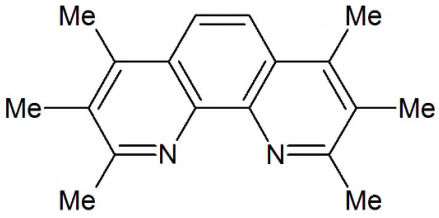
(2)



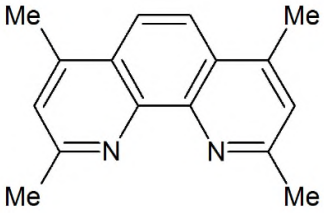
(3)



(4)



(5)



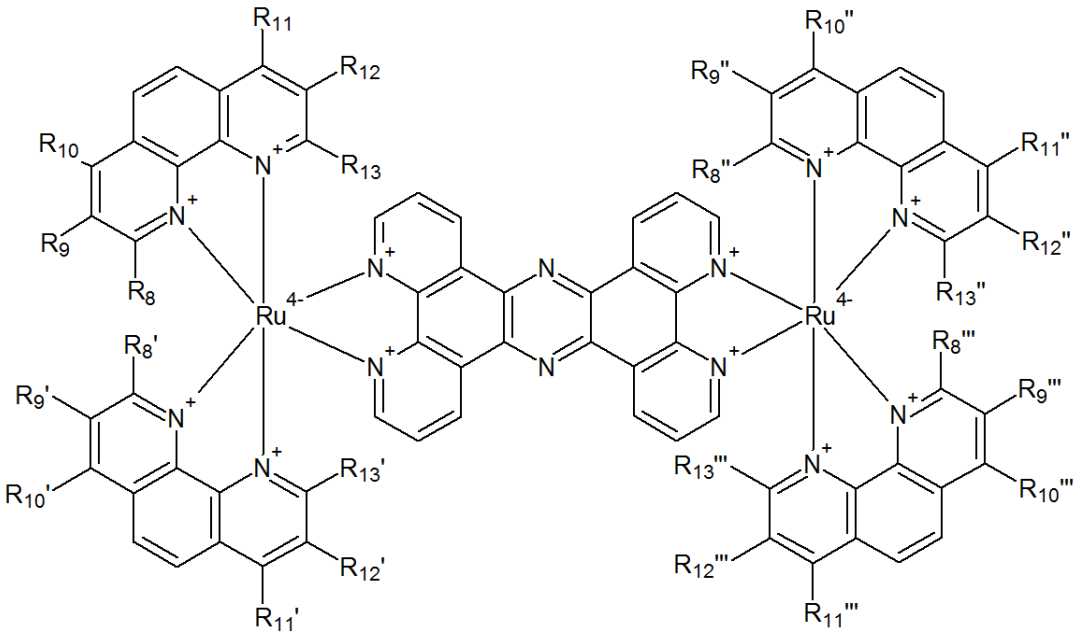
(6)



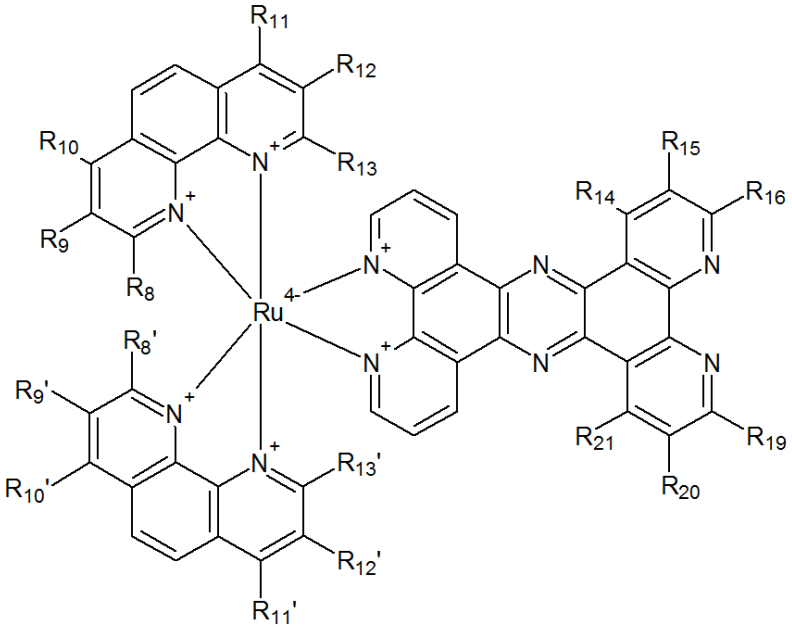
(7)

or combination thereof.

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



formula (IV)



formula (IVa)

wherein

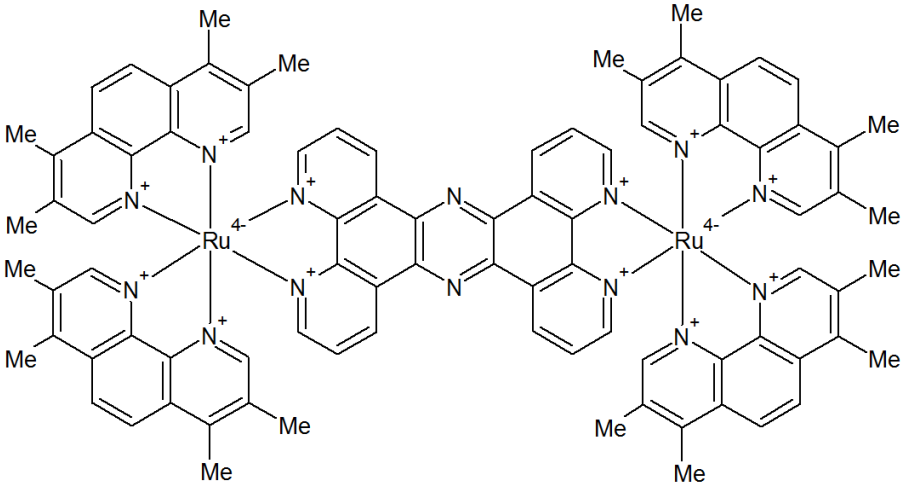
R_8, R_8', R_8'', R_8''', R_9, R_9', R_9'', R_9''', R_{10}, R_{10}', R_{10}'', R_{10}''', R_{11}, R_{11}', R_{11}'', R_{11}''', R_{12}, R_{12}', R_{12}'', R_{12}''', R_{13}, R_{13}', R_{13}'' and R_{13}''' are each independently selected from: hydrogen, alkyl, alkoxy, alkenyl and aryl;

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

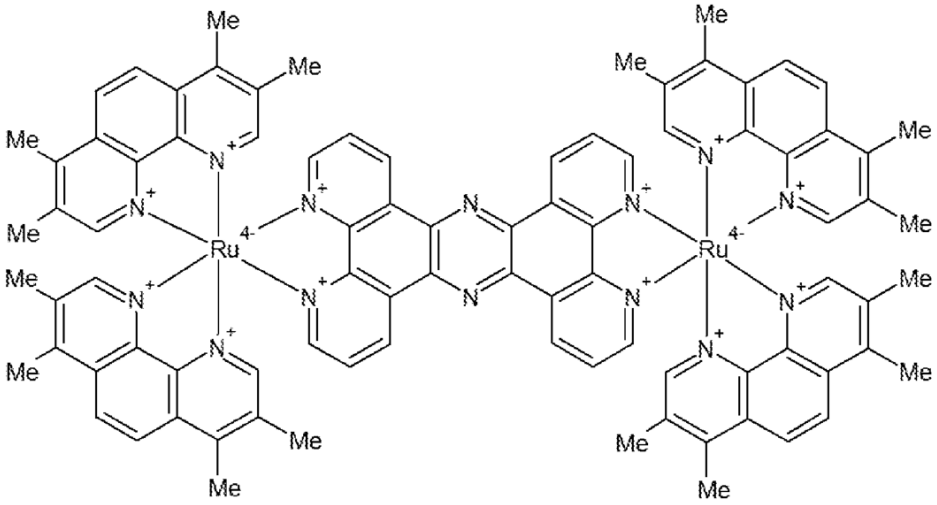
wherein R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20} and R_{21} are each independently selected from: hydrogen, alkyl, alkenyl, aryl, halogen, hydroxy, alkoxy or combinations thereof.

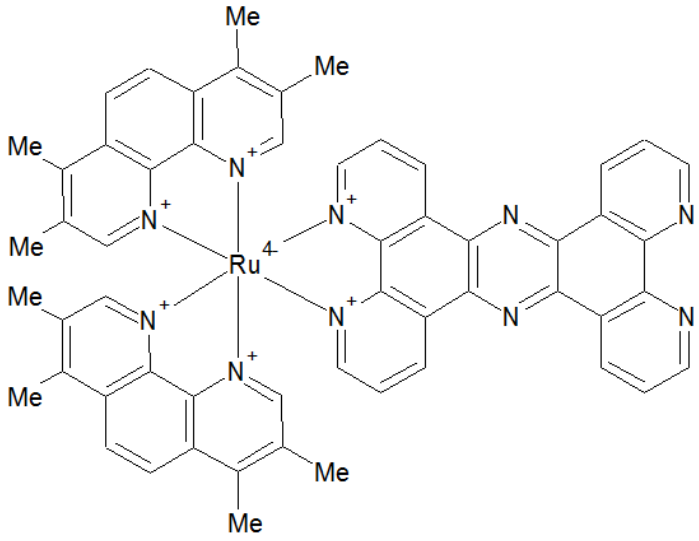
9. A compound for use according to claim 8, wherein: R_8, R_8', R_8'' and R_8''' are identical; R_9, R_9', R_9'' and R_9''' are identical; R_{10}, R_{10}', R_{10}'' and R_{10}''' are identical; R_{11}, R_{11}', R_{11}'' and R_{11}''' are identical; R_{12}, R_{12}', R_{12}'' and R_{12}''' are identical;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

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



formula (V)





formula (Va)

or pharmaceutically acceptable salt thereof.

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

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