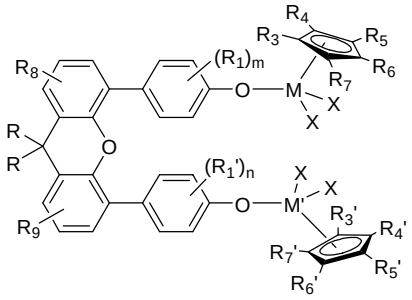
We claim :

1. A bisphenol metal complex having a structure represented by Formula Ia:

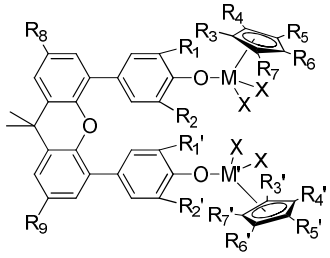


Formula Ia,

wherein, R_1 and R_1' are each independently selected from the group consisting of hydrogen and substituted or unsubstituted C_1-C_{20} hydrocarbyl; R_3-R_7, R_3'-R_7' are each independently selected from the group consisting of hydrogen and substituted or unsubstituted C_1-C_{20} hydrocarbyl, and any two adjacent groups of R_3-R_7 are optionally joined to form a ring, and any two adjacent groups of R_3'-R_7' are optionally joined to form a ring; R_8 and R_9 are each independently selected from the group consisting of hydrogen and substituted or unsubstituted C_1-C_{20} hydrocarbyl; each R is independently selected from the group consisting of hydrogen and substituted or unsubstituted C_1-C_{20} hydrocarbyl; M and M' are each independently a Group 4 metal; each X is independently selected from the group consisting of hydrocarbyl having 1 to 20 carbon atoms, hydride, amido, alkoxide, alkyl sulfide, alkyl phophide, halide, diene, amine, phosphine, ether, and combinations thereof; and m and n are independently an integer of from 1 to 4,

the term "substituted" meaning that one or more hydrogen atoms on the group in question is replaced with a C1-C6 alkyl, phenyl, benzyl, a halogen atom, a heteroatom, a C1-C6 alkoxy, or a carbon atom in main chain of the group in question is replaced by a heteroatom.

2. The bisphenol metal complex as claimed in claim 1, which has a structure represented by Formula Ib:



Formula Ib

wherein, R_1, R_1', R_2, R_2' are each independently selected from the group consisting of hydrogen and substituted or unsubstituted C_1-C_{20} hydrocarbyl; R_3-R_7, R_3'-R_7' are each independently selected from the group consisting of hydrogen and substituted or unsubstituted

C_1-C_{20} hydrocarbyl, and any two adjacent groups of R_3-R_7 are optionally joined to form a ring, and any two adjacent groups of R_3'-R_7' are optionally joined to form a ring; R_8 and R_9 are each independently selected from the group consisting of hydrogen and substituted or unsubstituted C_1-C_{20} hydrocarbyl; M and M' are each independently a Group 4 metal; each X is independently selected from the group consisting of hydrocarbyl having 1 to 20 carbon atoms, hydride, amido, alkoxide, alkyl sulfide, alkyl phophide, halide, diene, amine, phosphine, ether, and combinations thereof.

3. The bisphenol metal complex as claimed in any one of claims 1 to 2, having at least one of the following features:

- in Formulae Ia and Ib, R_1, R_1', R_2, R_2' are each independently selected from the group consisting of hydrogen, substituted or unsubstituted, linear or branched C_1-C_{20} alkyl and substituted or unsubstituted C_6-C_{20} aryl, preferably from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_{10} alkyl, and more preferably from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_6 alkyl;

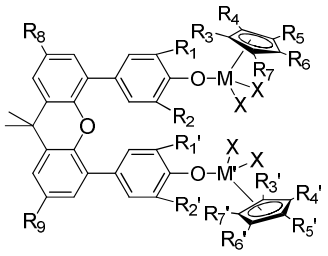
- in Formulae Ia and Ib, R_3-R_7, R_3'-R_7' are each independently selected from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_{20} alkyl, preferably from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_{10} alkyl, and more preferably from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_6 alkyl;

- in Formulae Ia and Ib, R_8 and R_9 are each independently selected from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_{20} alkyl, preferably from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_{10} alkyl, and more preferably from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_6 alkyl;

- in Formulae Ia and Ib, M and M' are each independently selected from the group consisting of titanium, zirconium and hafnium, and preferably titanium; and

- in Formulae Ia and Ib, each X is independently selected from the group consisting of methyl, fluoride, chloride, bromide and iodide, preferably methyl or chloride.

4. The bisphenol metal complex as claimed in claim 2, which is at least one selected from the following complexes represented by Formula Ib:


Formula Ib

bisphenol metal complex 1: $R_1=R_2=R_1'=R_2'=Me$, $R_3=R_4=R_5=R_6=R_7=R_3'=R_4'=R_5'=R_6'=R_7'= R_8=R_9=H$, M=M'=Ti, X=Cl;

bisphenol metal complex 2: $R_1=R_2=R_1'=R_2'=Et$, $R_3=R_4=R_5=R_6=R_7=R_3'=R_4'=R_5'=R_6'=R_7'= R_8=R_9=H$, M=M'=Ti, X=Cl;

bisphenol metal complex 3: $R_1=R_2=R_1'=R_2'=iPr$, $R_3=R_4=R_5=R_6=R_7=R_3'=R_4'=R_5'=R_6'=R_7'= R_8=R_9=H$, M=M'=Ti, X=Cl;

bisphenol metal complex 4: $R_1=R_2=R_1'=R_2'=tBu$, $R_3=R_4=R_5=R_6=R_7=R_3'=R_4'=R_5'=R_6'=R_7'= R_8=R_9=H$, M=M'=Ti, X=Cl;

bisphenol metal complex 5: $R_1=R_2=R_1'=R_2'=Me$, $R_3=R_4=R_5=R_6=R_7=R_3'=R_4'=R_5'=R_6'=R_7'=Me$, $R_8=R_9=H$, M=M'=Ti, X=Cl;

bisphenol metal complex 6: $R_1=R_2=R_1'=R_2'=Et$, $R_3=R_4=R_5=R_6=R_7=R_3'=R_4'=R_5'=R_6'=R_7'=Me$, $R_8=R_9=H$, M=M'=Ti, X=Cl;

bisphenol metal complex 7: $R_1=R_2=R_1'=R_2'=iPr$, $R_3=R_4=R_5=R_6=R_7=R_3'=R_4'=R_5'=R_6'=R_7'=Me$, $R_8=R_9=H$, M=M'=Ti, X=Cl;

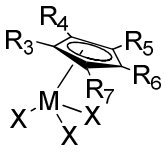
bisphenol metal complex 8: $R_1=R_2=R_1'=R_2'=tBu$, $R_3=R_4=R_5=R_6=R_7=R_3'=R_4'=R_5'=R_6'=R_7'=Me$, $R_8=R_9=H$, M=M'=Ti, X=Cl;

and corresponding compounds wherein X=methyl.

5. A method for preparing the bisphenol metal complex as claimed in claim 1, comprising the steps of:

1) reacting a corresponding bisphenol compound with a strong base to form a bisphenol di-salt; and

2) reacting the bisphenol di-salt with a metal complex represented by Formula V to obtain the bisphenol metal complex represented by Formula Ia,

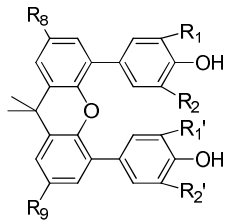

Formula V

wherein, R_3-R_7, M and X have the same meanings as defined for Formula Ia in claim 1.

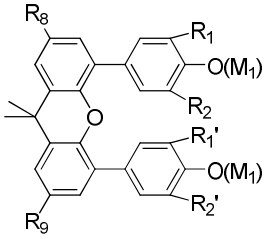
6. A method for preparing the bisphenol metal complex as claimed in claim 2, comprising the steps of:

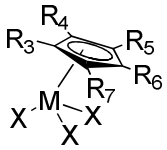
1) reacting a bisphenol compound represented by Formula II with a metal compound represented by Formula III to obtain a bisphenol di-salt represented by Formula IV; and

2) reacting the bisphenol di-salt compound represented by Formula IV with a metal complex represented by Formula V to obtain the bisphenol metal complex represented by Formula Ib;



M_1-R





Formula II, Formula III, Formula IV, Formula V,

wherein, in Formulae II and IV, R_1, R_1', R_2, R_2', R_8 and R_9 have the same meanings as defined for Formula Ib in claim 2;

in Formula III, M_1 is a Group IA metal, preferably lithium, sodium or potassium, and R is hydrogen or a linear or branched C_1-C_{10} alkyl; and

in Formula V, R_3-R_7, M and X have the same meanings as defined for Formula Ib in claim 2.

7. The method as claimed in claim 6, having at least one of the following features:

- a molar ratio of the bisphenol compound represented by Formula II to the compound represented by Formula III is 1: (1-20), and preferably 1: (4-8);

- a reaction temperature for the reaction between the bisphenol compound represented by Formula II and the compound represented by Formula III is from -78 ℃ to 60 ℃, and preferably from -10 ℃ to 40 ℃;

- a reaction time for the reaction between the bisphenol compound represented by Formula II and the compound represented by Formula III is from 1 to 10 hours, and preferably from 1.5 to 3 hours;

- a molar ratio of the compound represented by Formula IV to the metal compound represented by Formula V is 1: (1.8-2.4), and preferably 1: 2;

- a reaction temperature for the reaction between the compound represented by Formula IV and the metal compound represented by Formula V is from -78 ℃ to 60 ℃, and preferably from -10 ℃ to 40 ℃; and

- a reaction time for the reaction between the compound represented by Formula IV and the metal compound represented by Formula V is from 6 to 24 hours, and preferably from 8 to 16 hours.

8. Use of the bisphenol metal complex as claimed in any one of claims 1 to 4 in olefin

polymerization.