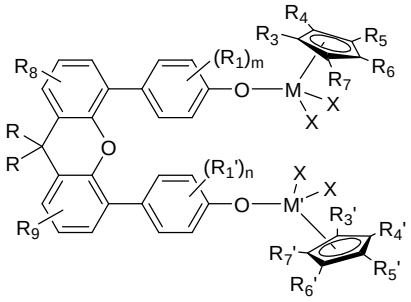
We claim:

1. A catalyst for olefin polymerization, comprising a main catalyst and a cocatalyst, wherein the main catalyst comprises bisphenol metal complex represented by Formula Ia:

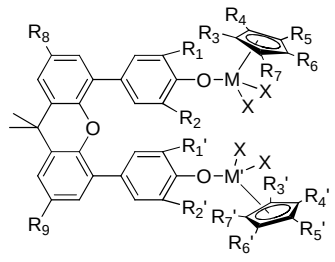


Formula Ia,

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, and

wherein the cocatalyst includes an organoaluminum compound.

2. The catalyst for olefin polymerization as claimed in claim 1, wherein the bisphenol metal complex 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 catalyst 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;

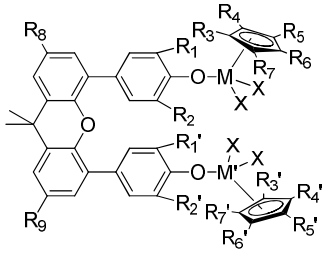
- in Formulae Ia and Ib, R_8 and R_9 are each independently selected from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_{20} alkyl, preferably from the group consisting of hydrogen and substituted or unsubstituted, linear or branched C_1-C_{10} alkyl, and 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, 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 catalyst as claimed in claim 1, wherein the bisphenol metal complex 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;

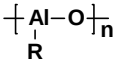
bisphenol metal complex 6: $R_1=R_2=R_1'=R_2'$=Et, $R_3=R_4=R_5=R_6=R_7=R_3'=R_4'=R_5'=R_6'=R_7'$=Me, $R_8=R_9$=H, M=M'=Ti, X=Cl;

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. The catalyst as claimed in any one of claims 1 to 4, wherein the organoaluminum compound includes an aluminoxane having the following general formula:

 Formula VI,

wherein, R is a C_1-C_{12} hydrocarbyl, preferably methyl or isobutyl, preferably the aluminoxane is methylaluminoxane (MAO) or modified methylaluminoxane.

6. The catalyst as claimed in claim 5, wherein a molar ratio of the main catalyst to the cocatalyst (in terms of metal for the main catalyst and in terms of aluminum for the cocatalyst) is 1: (200 - 5000), and preferably 1: (2000 - 3000).

7. The catalyst as claimed in any one of claims 1 to 6, wherein the cocatalyst comprises a combination of an organoaluminum compound and an organoboron compound, the organoaluminum compound is selected from the group consisting of aluminum alkyls and alkyl aluminum halides, or the organoaluminum compound is selected from the group consisting of aluminoxanes and modified aluminoxanes, the organoboron compound is selected from the group consisting of aromatic hydrocarbyl borons and borates.

8. The catalyst as claimed in claim 7, wherein a molar ratio of the main catalyst (in terms of the metal in the catalyst compound) to the organoboron compound (in terms of boron) to the organoaluminum compound (in terms of aluminum) is 1: (1-10) : (100 - 2000), and preferably 1: (2-8) : (200 - 1000).

9. The catalyst as claimed in any one of claims 1 to 8, wherein the main catalyst comprises the bisphenol metal complex represented by Formula Ia and a support material.

10. Use of the catalyst as claimed in any one of claims 1 to 9 in olefin polymerization.

11. An ethylene homopolymerization process, comprising polymerizing ethylene monomer in the presence of the catalyst as claimed in any one of claims 1 to 9.

12. The ethylene homopolymerization process as claimed in claim 11, wherein the polymerization

1) is performed in the presence of the catalyst system comprising a main catalyst and a cocatalyst, the cocatalyst including an organoaluminum compound and an organoboron compound,

preferably, the organoaluminum compound is selected from the group consisting of aluminum alkyls, alkyl aluminum halides and alkylaluminoxanes, for example,

trimethylaluminum, triethylaluminum, triisobutylaluminum, tri-n-hexylaluminum, trioctylaluminum, diethylaluminum hydride, diisobutylaluminum hydride, diethylaluminum chloride, diisobutylaluminum chloride, ethyl aluminum sesquichloride, ethylaluminum dichloride, methylaluminoxane and modified methylaluminoxane,

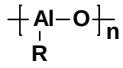
preferably, the organoboron compound is selected from the group consisting of aromatic hydrocarbyl boron compounds and borates, for example, substituted or unsubstituted phenyl boron, such as tris(pentafluorophenyl)boron, N,N-dimethylanilinium tetrakis(pentafluorophenyl)borate and triphenylcarbonium tetrakis(pentafluorophenyl)borate,

preferably, a molar ratio of the main catalyst (in terms of the metal in the catalyst compound) to the organoboron compound (in terms of boron) to the organoaluminum compound (in terms of aluminum) is 1: (1-10) : (100 - 2000), preferably 1: (2-8) : (200 - 1000); or

2) is performed in the presence of the catalyst system comprising a main catalyst and a cocatalyst, wherein the cocatalyst comprises an aluminoxane,

preferably, a molar ratio of the main catalyst (in terms of the metal in the catalyst compound) to the aluminoxane (in terms of aluminum) is 1: (200 - 5000), preferably 1: (2000 - 3000),

preferably, the aluminoxane has a general formula:

 Formula VI,

wherein, R is a C_1-C_{12} hydrocarbyl, and preferably methyl or isobutyl, and preferably the aluminoxane is methylaluminoxane (MAO) or modified methylaluminoxane, more preferably methylaluminoxane.

13. The ethylene homopolymerization process as claimed in claim 11 or 12, wherein the polymerization

1) is performed at a temperature of -30 to 150 °C, and preferably 50 to 110 °C;

2) is performed under a pressure of 0.1 to 10MPa, and preferably 0.5 to 4MPa;

3) is performed for a period of time of 10 to 60 minutes; and/or

4) is performed in an inert solvent, wherein the solvent may be an arene or an alkane, for example, benzene, toluene, hexane, heptane and a mixture thereof.

14. An ethylene copolymerization process, where ethylene and a comonomer

are polymerized in the presence of the catalyst as claimed in any one of claim 1 to 9.

15. The ethylene copolymerization process as claimed in claim 14, wherein the polymerization

1) is performed in the presence of the catalyst system comprising a main catalyst and a cocatalyst, the cocatalyst including an organoaluminum compound and an organoboron compound,

preferably, the organoaluminum compound is selected from the group consisting of aluminum alkyls, alkyl aluminum halides and alkylaluminoxane, for example, trimethylaluminum, triethylaluminum, triisobutylaluminum, tri-n-hexylaluminum, trioctylaluminum, diethylaluminum hydride, diisobutylaluminum hydride, diethylaluminum chloride, diisobutylaluminum chloride, ethyl aluminum sesquichloride, ethylaluminum dichloride, methylaluminoxane and modified methylaluminoxane,

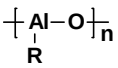
preferably, the organoboron compound is selected from the group consisting of aromatic hydrocarbyl boron compounds and borates, for example, substituted or unsubstituted phenyl boron, such as tris(pentafluorophenyl)boron, N,N-dimethylanilinium tetrakis(pentafluorophenyl)borate and triphenylcarbonium tetrakis(pentafluorophenyl)borate,

preferably, a molar ratio of the main catalyst to the organoboron compound to the organoaluminum compound is 1: (1-10) : (100 - 2000), preferably 1: (2-8) : (200 - 1000); alternatively a molar ratio of the main catalyst to the organoboron compound to the organoaluminum compound is 1 : (1-20) : (200 - 2000), preferably 1 : (1-10) : (200 - 2000) or 1: (4-16) : (300-1000); or

2) is performed in the presence of the catalyst system comprising a main catalyst and a cocatalyst, the cocatalyst comprising an aluminoxane,

preferably, a molar ratio of the main catalyst to the aluminoxane is 1: (200 - 5000), preferably 1: (2000 - 3000),

preferably, the aluminoxane has a general formula:



Formula VI,

wherein, R is a C_1-C_{12} hydrocarbyl, and preferably methyl or isobutyl, and preferably the aluminoxane is methylaluminoxane (MAO) or modified methylaluminoxane, more preferably methylaluminoxane.

16. The ethylene copolymerization process as claimed in claim 14 or 15, wherein the polymerization

1) utilizes the comonomer including an α-olefin and/or a diene, preferably a C4-C10 α-olefin and/or diene, for example, one or more of propylene, butene, pentene, hexene, octene and 4-methyl-1-pentene;

2) is performed at a temperature of -30 to 150 °C, and preferably 25-100 °C;

3) is performed under a pressure of 0.1 to 10MPa, and preferably 0.5 to 4MPa;

4) is performed for a period of time of 10 to 60 minutes; and/or

5) is performed in an inert solvent, wherein the solvent may be an arene or an alkane, for example, benzene, toluene, hexane, heptane and a mixture thereof.