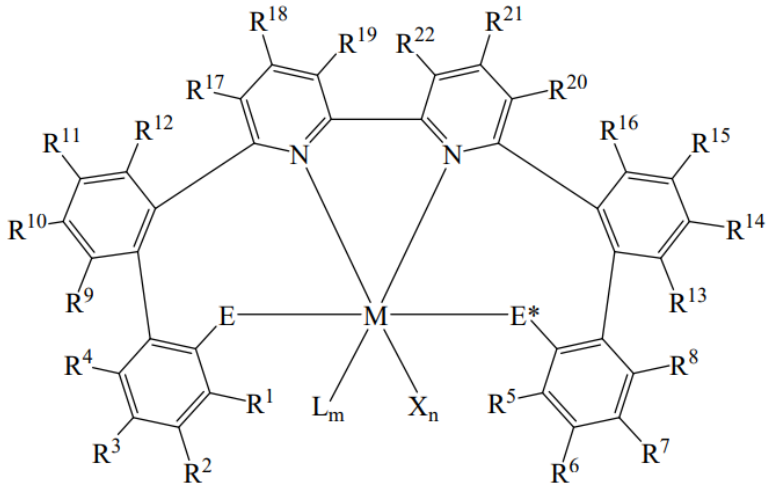
Claims:

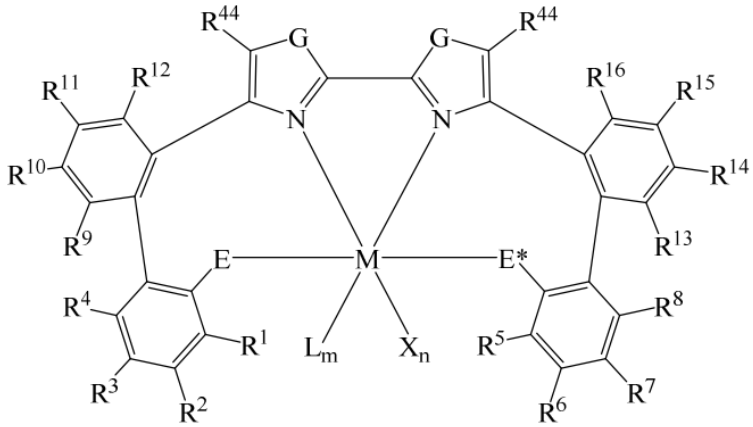
What is claimed is:

1. A catalyst compound represented by one of the Formulas (**III**) or (IV):



(III)

or



(IV)

wherein,

M is a group 3, 4, 5, or 6 transition metal or Lanthanide;

E is O, S, or NR^{99}, where R^{99} is hydrogen, C_1-C_{40} hydrocarbyl, C_1-C_{40} substituted hydrocarbyl, monovalent heteroatom, or a monovalent substituted heteroatom group;

E* is O, S, or NR^{99}, where R^{99} is hydrogen, C_1-C_{40} hydrocarbyl, C_1-C_{40} substituted hydrocarbyl, or a heteroatom containing group;

L is a neutral Lewis base;

X is an anionic ligand;

n is 1 or 2;

m is 0 or 1;

n+m is 0, 1 or 2;

each of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, R^{20}, R^{21} and R^{22} is independently hydrogen, C_1-C_{40} hydrocarbyl, C_1-C_{40} substituted hydrocarbyl, a heteroatom, or substituted heteroatom group, or optionally one or more adjacent R groups join to form a hydrocarbyl ring, substituted hydrocarbyl ring, heterocyclic ring, or substituted heterocyclic ring, said ring having 5, 6, 7, or 8 ring atoms, and where substituents on the ring can join to form one or more additional hydrocarbyl rings, substituted hydrocarbyl rings, heterocyclic rings, or substituted heterocyclic rings, said rings having 5, 6, 7, or 8 ring atoms; and

each G is independently S, O, or NR^{24}, and

each R^{24} group and each R^{44} group is independently selected from hydrogen, heteroatoms, C_1-C_{20} alkyls, C_1-C_{20} alkoxides, C_1-C_{20} amides, and C_1-C_{20} substituted alkyls, and wherein two adjacent R^{24} and or R^{44} groups on the same ring can be joined to form one or more hydrocarbyl rings, substituted hydrocarbyl rings, heterocyclic rings or a substituted heterocyclic rings, where each ring has 5, 6, 7, or 8 ring atoms, and where substituents on the ring can join to form one or more additional hydrocarbyl rings, substituted hydrocarbyl rings, heterocyclic rings, or substituted heterocyclic rings; and

an X group may be joined to an L group to form a monoanionic bidentate group, and any two X groups may be joined together to form a dianionic ligand group.

2. The catalyst compound of claim 1, wherein M is Hf, Ti and/or Zr.

3. The catalyst compound of any of claims 1 to 2, wherein E and E* if present are oxygen.

4. The catalyst compound of claim 1, wherein the catalyst compound is represented by Formula (**IV**) and E and E* are O, each G is S or NR^{24}, each R^{24} is selected from C_1-C_{20} alkyl, and each R^{44} is selected from hydrogen or C_1-C_{20} alkyl.

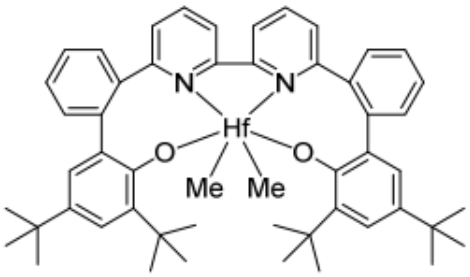
5. The catalyst compound of claim 4, wherein each G is NR^{24}, each R^{24} is methyl, ethyl, or propyl, and each R^{44} is hydrogen.

6. The catalyst compound of claim 4, wherein each G is S and each R^{44} is hydrogen.

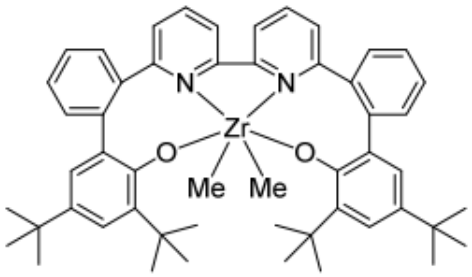
7. The catalyst compound of claim 1, wherein R^1 and R^5 is independently all isomers of methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, phenyl,

substituted phenyl, carbazolyl, substituted carbazolyl, indolyl, substituted indolyl, pyrrolyl, substituted pyrrolyl, naphthyl, substituted naphthyl, anthracenyl, substituted anthracenyl, fluorenyl, substituted fluorenyl, cyclohexyl, cyclooctyl, cyclododecyl, adamantanyl, and substituted adamantanyl.

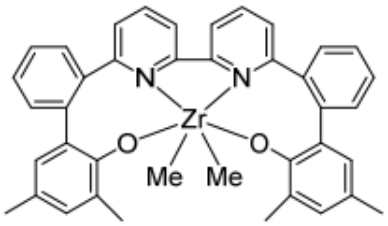
8. The catalyst compound of claim 1, wherein the catalyst compound comprises one or more of the following catalyst compounds:



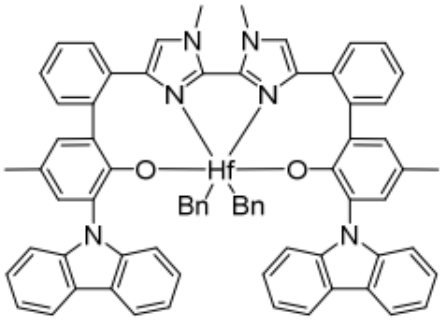
Catalyst 1



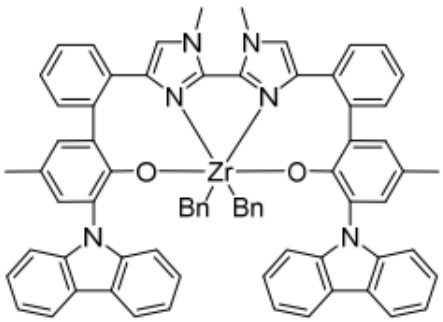
Catalyst 2



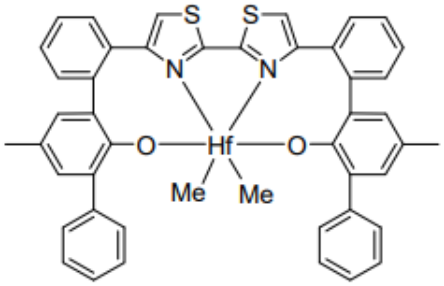
Catalyst 3



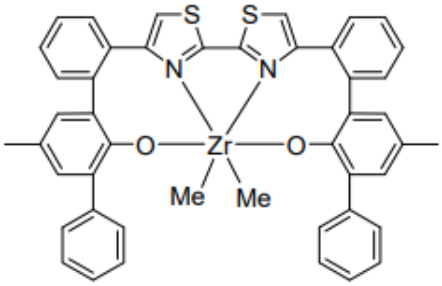
Catalyst 4



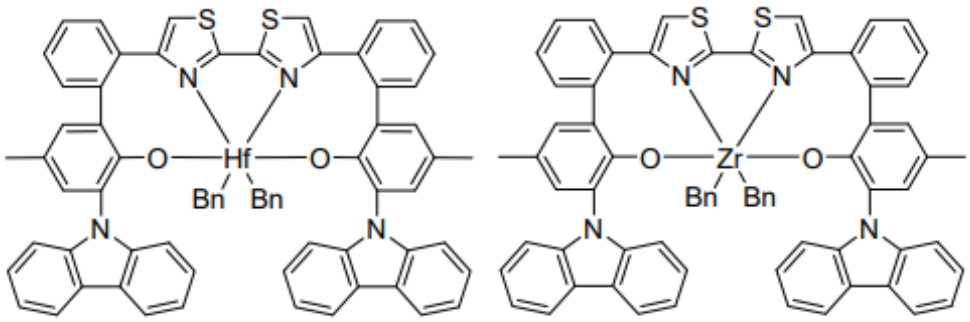
Catalyst 5



Catalyst 6



Catalyst 7



Catalyst 8 Catalyst 10

9. A process to polymerize olefins, preferably C_2 to C_{40} olefins, comprising:

contacting one or more olefins with a catalyst system including the catalyst compound of any one of claims 1 to 8; and

obtaining a polymer.