

(I)

wherein M is titanium, zirconium, or hafnium;

wherein each X is independently a monodentate or polydentate ligand that is neutral, monoanionic, or dianionic, wherein n is an integer, and wherein X and n are chosen in such a way that the metal-ligand complex of Formula (I) is overall neutral;

wherein each R^1 and R^5 independently is selected from the group consisting of (C_1-C_{40})hydrocarbyls, substituted (C_1-C_{40})hydrocarbyls, (C_1-C_{40})heterohydrocarbyls, and substituted (C_1-C_{40})heterohydrocarbyls;

wherein each R^2 and R^4 independently is selected from a group consisting of (C_1-C_{40})hydrocarbyls and substituted (C_1-C_{40})hydrocarbyls;

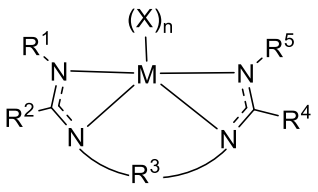
wherein R^3 is selected from the group consisting of a (C_3-C_{40})hydrocarbylene, substituted (C_3-C_{40})hydrocarbylene, [(C+Si)$_3$-(C+Si)$_{40}$]organosilylene, substituted [(C+Si)$_3$-(C+Si)$_{40}$]organosilylene, [(C+Ge)$_3$-(C+Ge)$_{40}$]organogermylene, or substituted [(C+Ge)$_3$-(C+Ge)$_{40}$]organogermylene such that there are at least three atoms in the shortest R^3 chain connecting the bridged N atoms of Formula (I);

wherein each N independently is nitrogen; and

optionally, two or more R^{1-5} groups each independently can combine together to form mono-aza ring structures, with such ring structures having from 5 to 16 atoms in the ring excluding any hydrogen atoms.

[0006a] In one aspect, there is provided an olefin polymerization catalyst system comprising:

a procatalyst component comprising a metal-ligand complex of Formula (I):



(I)

where:

M is titanium, zirconium, or hafnium;

each X is independently a monodentate or polydentate ligand that is neutral, monoanionic, or dianionic, wherein n is an integer, and wherein X and n are chosen in such a way that the metal-ligand complex of Formula (I) is overall neutral;

R^1 and R^5 are independently a $(C_6\text{-}C_{40})$aryl or substituted $(C_6\text{-}C_{40})$aryl groups;

each R^2 and R^4 independently is selected from a group consisting of $(C_1\text{-}C_{40})$hydrocarbyls and substituted $(C_1\text{-}C_{40})$hydrocarbyls;

R^3 is selected from the group consisting of a $(C_3\text{-}C_{40})$hydrocarbylene, substituted $(C_3\text{-}C_{40})$hydrocarbylene, $[(C+Si)_3\text{-}(C+Si)_{40}]$organosilylene, substituted $[(C+Si)_3\text{-}(C+Si)_{40}]$organosilylene, $[(C+Ge)_3\text{-}(C+Ge)_{40}]$organogermylene, and substituted $[(C+Ge)_3\text{-}(C+Ge)_{40}]$organogermylene such that there are at least three atoms in the shortest R^3 chain connecting the bridged N atoms of Formula (I);

each N independently is nitrogen; and

optionally, two or more $R^{1\text{-}5}$ groups each independently can combine together to form mono-aza ring structures, with such ring structures having from 5 to 16 atoms in the ring excluding any hydrogen atoms.

[0007] In one example, the instant disclosure provides an olefin-based composition comprising the polymerization reaction product of one or more olefin monomers in the presence of the olefin polymerization catalyst system, as described above.

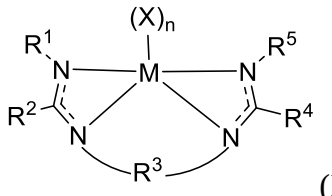
[0008] In an alternative example, the instant disclosure further provides an olefin polymerization process comprising polymerizing one or more olefin monomers in the presence of the olefin polymerization catalyst, as described above.

[0008a] In another aspect, there is provided a process for polymerizing one or more olefin-based polymers comprising the steps of polymerizing one or more olefin monomers in the presence of the one or more olefin polymerization catalyst systems as defined herein.

Claims

1. An olefin polymerization catalyst system comprising:

a procatalyst component comprising a metal-ligand complex of Formula (I):



(I)

where:

M is titanium, zirconium, or hafnium;

each X is independently a monodentate or polydentate ligand that is neutral, monoanionic, or dianionic, wherein n is an integer, and wherein X and n are chosen in such a way that the metal-ligand complex of Formula (I) is overall neutral;

R^1 and R^5 are independently a $(C_6\text{-}C_{40})$aryl or substituted $(C_6\text{-}C_{40})$aryl groups;

each R^2 and R^4 independently is selected from a group consisting of $(C_1\text{-}C_{40})$hydrocarbyls and substituted $(C_1\text{-}C_{40})$hydrocarbyls;

R^3 is selected from the group consisting of a $(C_3\text{-}C_{40})$hydrocarbylene, substituted $(C_3\text{-}C_{40})$hydrocarbylene, $[(C+Si)_3\text{-}(C+Si)_{40}]$organosilylene, substituted $[(C+Si)_3\text{-}(C+Si)_{40}]$organosilylene, $[(C+Ge)_3\text{-}(C+Ge)_{40}]$organogermylene, and substituted $[(C+Ge)_3\text{-}(C+Ge)_{40}]$organogermylene such that there are at least three atoms in the shortest R^3 chain connecting the bridged N atoms of Formula (I);

each N independently is nitrogen; and

optionally, two or more $R^{1\text{-}5}$ groups each independently can combine together to form mono-aza ring structures, with such ring structures having from 5 to 16 atoms in the ring excluding any hydrogen atoms.

2. The olefin polymerization catalyst system according to claim 1, wherein each X independently is Me, Bn, or Cl.

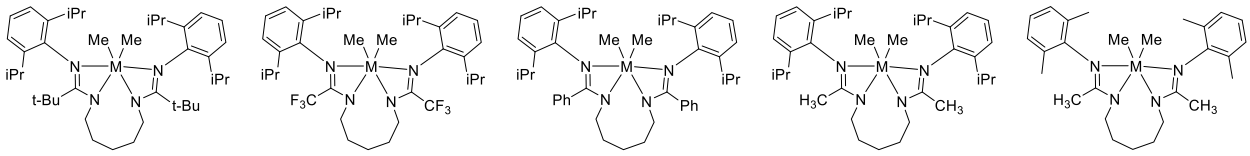
3. The olefin polymerization catalyst system according to claim 1, wherein R^3 is an optionally substituted 5 atom bridge such that 5 atoms define the shortest chain connecting the bridged N atoms of Formula (I).

4. The olefin polymerization catalyst system according to claim 1, wherein R^3 is a substituted 5 atom bridge such that 5 atoms define the shortest chain connecting the bridged N atoms of Formula (I).

5. The olefin polymerization catalyst system according to claim 1, wherein R^2 and R^4 are each independently a methyl group.

6. The olefin polymerization catalyst system according to claim 1, wherein R^2 and R^4 are methyl groups, R^3 is a 5 atom bridge such that 5 atoms define the shortest chain connecting the bridged N atoms of Formula (I) and R^1 and R^5 is a substituted (C_6-C_{40})aryl group.

7. The olefin polymerization catalyst system according to claim 1, wherein said metal-ligand complex of Formula (I) is selected from the group consisting of the compounds represented by the following structures



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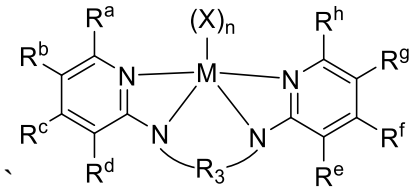
8. The olefin polymerization catalyst system according to claim 1 comprising a pro-catalyst of structure (II)

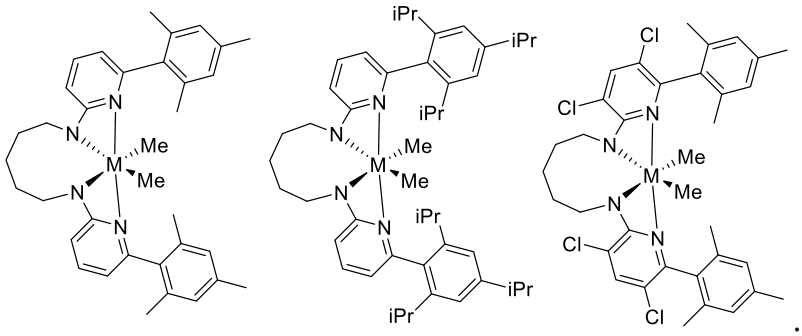


(II)

wherein R^a-R^h are hydrocarbyl, substituted hydrocarbyl, heterohydrocarbyl, substituted heterohydrocarbyl, aryl, heteroaryl, alkyl, substituted alkyl, perfluoro alkyl, organosilyl, halogen or hydrogen groups.

9. The olefin polymerization catalyst system according to claim 8 wherein R^a and R^h are aryl and substituted aryl groups.

10. The olefin polymerization catalyst system according to claim 1, wherein said metal-ligand complex of Formula (I) is selected from the group consisting of



11. The olefin polymerization catalyst system according to claim 1 wherein M is zirconium or hafnium.

12. A process for polymerizing one or more olefin-based polymers comprising the steps of polymerizing one or more olefin monomers in the presence of the one or more olefin polymerization catalyst systems according to claim 1.

13. The process for polymerizing one or more olefin-based polymers according to claim 12 wherein the polymerizing further occurs in the presence of an activator selected from MMAO, bis(hydrogenated tallow alkyl)methylammonium tetrakis(pentafluorophenyl)borate, or tris(pentafluorophenyl)borane.

14. The process for polymerizing one or more olefin-based polymers according to claim 12 wherein the polymerizing further occurs in the presence of a chain transfer agent.

15. The process for polymerizing one or more olefin-based polymers according to claim 14 wherein the chain transfer agent is dialkylzinc, trialkylaluminum, or hydrogen.