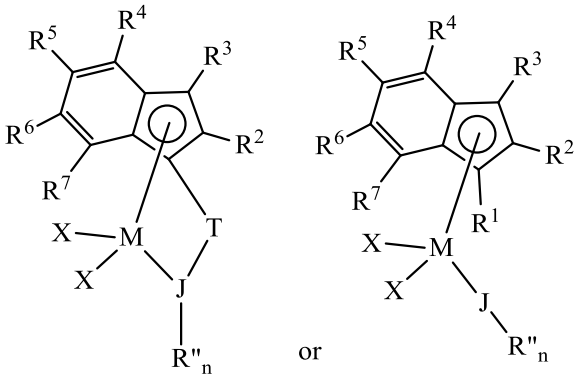
CLAIMS:

We claim:

1. A metallocene compound represented by one of the following formulae:



formula (2a) or formula (2b);

wherein

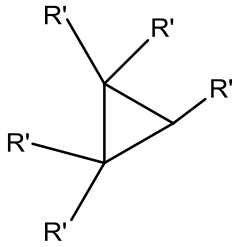
M is a transition metal atom having a coordination number of n* and selected from group 3, 4, or 5 of the Periodic Table of Elements, or a lanthanide metal atom, or actinide metal atom; n* is 3, 4, or 5;

each X is a univalent anionic ligand, or two Xs are joined and bound to the metal atom to form a metallocycle ring, or two Xs are joined to form a chelating ligand, a diene ligand, or an alkylidene ligand;

T is a bridging group;

J is a heteroatom with a coordination number of three from group 15 or with a coordination number of two from group 16 of the Periodic Table of Elements; R" is a C_1-C_{100} substituted or unsubstituted hydrocarbyl radical; n is the coordination number of the heteroatom J where "n" indicates the number of R" substituents bonded to J; and

each R^1, R^2, R^3, R^4, R^5, R^6, or R^7 is, independently, hydrogen, a substituted hydrocarbyl group, an unsubstituted hydrocarbyl group, provided that at least one of R^1, R^2, R^3, R^4, R^5, R^6, or R^7 is a cyclopropyl substituent; and provided that any adjacent R^1 to R^7 groups that are not a cyclopropyl substituent may form a fused ring or multicenter fused ring system where the rings may be aromatic, partially saturated or saturated, wherein the cyclopropyl substituent is represented by the formula:



where each R' is, independently, hydrogen, or a substituted or unsubstituted hydrocarbyl group.

2. The metallocene compound of claim 1, wherein M is a group 4 metal, preferably Hf, Ti or Zr.

3. The metallocene compound of claim 1, wherein each R' is hydrogen.

4. The metallocene compound of claim 1, wherein T is represented by the formula, $(R'''_2G)_g$, where each G is C, Si, or Ge, g is 1 or 2, and each R''' is, independently, hydrogen, halogen, C_1 to C_{20} hydrocarbyl or a C_1 to C_{20} substituted hydrocarbyl, and two or more R''' can form a cyclic structure including aromatic, partially saturated, or saturated cyclic or fused ring system.

5. The metallocene compound of claim 1, wherein R^2 is a cyclopropyl substituent and/ or R^4 is a cyclopropyl substituent.

6. The metallocene compound of claim 1, wherein when one of R^1, R^2, R^3, R^4, R^5, R^6, and R^7 is a cyclopropyl substituent, at least one of the other R^1 to R^7 substituents is not hydrogen.

7. The metallocene of compound of claim 1, wherein R^2 is a cyclopropyl and / or R^4 is hydrocarbyl or halogen.

8. The metallocene compound of claim 1, wherein J is nitrogen, phosphorus, oxygen or sulfur.

9. A metallocene catalyst selected from: dimethylsilylene-(2-cyclopropylindenyl)(tert-butylamido)zirconium dichloride; or dimethylsilylene-(2-cyclopropylindenyl)(tert-butylamido)titanium dichloride.

10. A catalyst system comprising activator and the metallocene catalyst compound of any of claims 1 to 9.

11. The catalyst system of claim 10, wherein the activator comprises alumoxane or a non-coordinating anion activator.

12. The catalyst system of claim 10, wherein the activator is one or more of: N,N-dimethylanilinium tetrakis(perfluoronaphthyl)borate, N,N-dimethylanilinium

tetrakis(perfluorobiphenyl)borate, N,N-dimethylanilinium tetrakis(3,5-bis(trifluoromethyl)phenyl)borate, triphenylcarbenium tetrakis(perfluoronaphthyl)borate, triphenylcarbenium tetrakis(perfluorobiphenyl)borate, triphenylcarbenium tetrakis(3,5-bis(trifluoromethyl)phenyl)borate, triphenylcarbenium tetrakis(perfluorophenyl)borate, $[Ph_3C^+]$ $[B(C_6F_5)_4^-]$, $[Me_3NH^+][B(C_6F_5)_4^-]$; l-(4-(tris(pentafluorophenyl)borate)-2,3,5,6-tetrafluorophenyl)pyrrolidinium; tetrakis(pentafluorophenyl)borate, and 4-(tris(pentafluorophenyl)borate)-2,3,5,6-tetrafluoropyridine.

13. The catalyst system of claim 10, wherein the catalyst system is supported, preferably on silica.

14. A process to polymerize olefins comprising contacting one or more olefins with the catalyst system of any of claims 10 to 13.

15. The process of claim 14, wherein the process occurs in solution, preferably at a temperature of from about 0°C to about 300°C, at a pressure in the range of from about 0.35 MPa to about 10 MPa, and at a time up to 300 minutes.

16. The process of claim 15 further comprising obtaining polymer, preferably polymer comprising ethylene and or propylene.

17. The process of claim 15 or 16, wherein an ethylene polymer (preferably a homopolymer of ethylene or a copolymer of ethylene and one or more of propylene, butene, hexene or octene) is obtained.

18. The process of claim 15 or 16, wherein a propylene polymer (preferably a homopolymer of propylene or a copolymer of propylene and one or more of ethylene, butene, hexene or octene) is obtained.