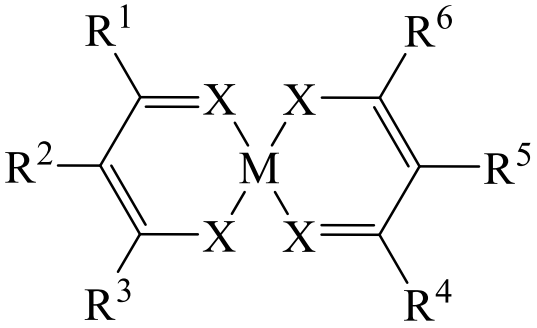
CLAIMS:

What is claimed is:

1. A process comprising:

introducing, neat or in the presence of a solvent, a feed comprising branched C_5-C_{30} internal olefins comprising tri-substituted olefins to a catalyst system comprising a catalyst compound, wherein the catalyst compound is represented by Formula (**I**):



(**I**)

wherein:

M is a group 8, 9, 10, or 11 metal;

each X is a heteroatom; and

each of R^1, R^3, R^4, and R^6 is independently selected from C_1-C_{40} hydrocarbyl, C_1-C_{40} substituted hydrocarbyl, a heteroatom or a heteroatom-containing group, each of R^2 and R^5 is independently selected from hydrogen, C_1-C_{40} hydrocarbyl, C_1-C_{40} substituted hydrocarbyl, a heteroatom or a heteroatom-containing group, wherein at least one of R^1, R^2, R^3, R^4, R^5, and R^6 is a heteroatom or a heteroatom-containing group, or one or more of R^1 and R^2, R^2 and R^3, R^4 and R^5, or R^5 and R^6 are joined to form one or more substituted hydrocarbyl rings, unsubstituted hydrocarbyl rings, substituted heterocyclic rings, or unsubstituted heterocyclic rings each having 5, 6, 7, or 8 ring atoms, wherein at least one of the rings is substituted with a heteroatom or a heteroatom-containing group if the remainder of R groups of Formula (I) are not a heteroatom or a heteroatom-containing group; and

obtaining a C_6-C_{100} polyolefin product having one or more of:

one olefin containing 2 sp^2 hybridized carbons,

a methylene content of from 1 wt% to 98 wt%, based on the total weight of the C_6-C_{100} polyolefin product, and

a methyl content of from 1 wt% to 75 wt%, based on the total weight of the C_6-C_{100} polyolefin product.

2. The process of claim 1, wherein the feed further comprises a linear C_4-C_{30} internal olefin.

3. The process of claim 1, wherein the feed further comprises a C_2-C_{30} alpha-olefin.

4. The process of claim 1, wherein the feed further comprises a linear C_4-C_{30} internal olefin and a C_2-C_{30} alpha-olefin.

5. The process of claim 1, wherein the heteroatom is fluorine.

6. The process of claim 1, wherein the feed further comprises one or more C_5 olefins selected from 2-Me-2-butene, 2-Me-1-butene, 3-Me-1-butene, 1-pentene, cis-2-pentene, trans-2-pentene, or mixture thereof.

7. The process of claim 1, wherein at least one of R^1, R^2, R^3, R^4, R^5, and R^6 are independently selected from a halogen or a halogen-containing group.

8. The process of claim 1, wherein each of R^1, R^3, R^4, and R^6 is CF_3 and each of R^2 and R^5 is independently selected from hydrogen, methyl, isopropyl, or fluorine.

9. The process of claim 8, wherein M is Ni.

10. The process of claim 1, wherein introducing comprises introducing the feed to the catalyst system comprising the catalyst compound and an activator.

11. The process of claim 10, wherein the catalyst system further comprises a support material.

12. The process of claim 10, wherein the activator comprises an alkylaluminoxane.

13. The process of claim 1, wherein introducing is performed in the presence of a solvent selected from n-hexane, n-heptane, cyclohexane, benzene, toluene, xylenes, or a mixture thereof.

14. The process of claim 1, wherein introducing is performed in the presence of a solvent at a ratio of an olefin to solvent of from 1:0 to 1:10.

15. The process of claim 1, wherein a molar ratio of catalyst to activator is from 10:1 to 1:1,000.

16. The process of claim 15, wherein the molar ratio of catalyst to activator is 1:3.

17. The process of claim 1, wherein a catalyst loading is from 0.0001 mol% to 5 mol%.

18. The process of claim 1, wherein a turnover number (TON) of the catalyst is from 10 to 10,000.

19. The process of claim 1, wherein introducing is performed at a temperature of from 20°C to 250°C.

20. The process of claim 19, wherein introducing is performed at a pressure of from 0 psig to 1,000 psig.

21. The process of claim 20, wherein the reaction time is from 1 minute to 72 hours.

22. The process of claim 1 comprising: polymerizing the feed of claim 1 by contacting the branched C_5-C_{30} internal olefin with the catalyst, in one or more polymerization reactors, in series or in parallel, at a reactor pressure of from 0 psig to 1,000 psig and a reactor temperature from 120°C or less, to form the C_6-C_{100} polyolefin product.

23. The process of claim 1 comprising: polymerizing the feed of claim 2 comprising a linear C_4-C_{30} internal olefin by contacting the linear C_4-C_{30} internal olefin with the catalyst, in one or more polymerization reactors, in series or in parallel, at a reactor pressure of from 0 psig to 1,000 psig, and a reactor temperature from 120°C or less, to form the C_6-C_{100} polyolefin product.

24. The process of claim 1, wherein the feed is converted to the C_6-C_{100} polyolefin product at a conversion (%) of from 2% to 99%.