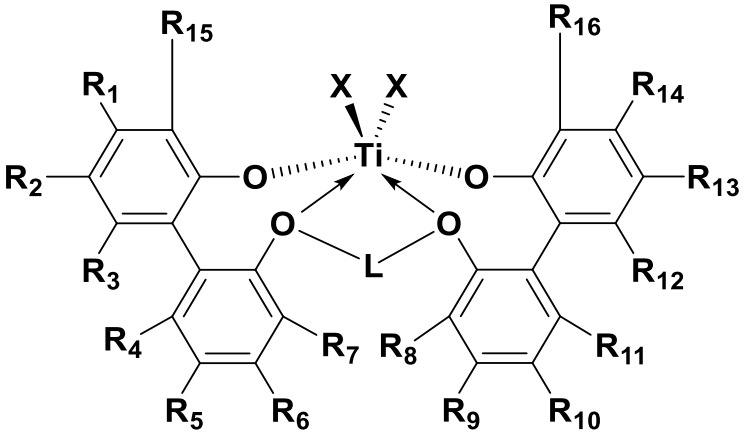
What is claimed is:

1. A titanium biphenylphenol polymerization precatalyst of Formula I:



(Formula I)

wherein each of R^7 and R^8 is independently a C_1 to C_{20} alkyl, aryl, aralkyl or a hydrogen;

wherein each of R^5 and R^{10} is independently a C_1 to C_{20} alkyl, aryl, aralkyl, halide, or a hydrogen;

wherein each of R^2 and R^{13} is independently a C_1 to C_{20} alkyl, aryl, aralkyl or a hydrogen;

wherein each of R^{15} and R^{16} is a 2,7-disubstituted carbazole or a 3,6-disubstituted carbazole;

wherein L is a C_2-C_4 alkylene that forms a 2-carbon bridge, 3-carbon bridge, or a 4-carbon bridge respectively, between the two oxygen atoms to which L is covalently bonded;

wherein each of R^1, R^3, R^4, R^6, R^9, R^{11}, R^{12}, and R^{14} is independently a halide or a hydrogen; and

wherein each X is independently a hydrocarbyl, halide, pseudohalide, hydroxy group, alkoxy group, phenoxy group, aryloxy group, or a hydrogen and at least one X is not a hydrocarbyl.

2. The precatalyst of claim 1, wherein each of R^7 and R^8 is a C_1 alkyl or each of R^7 and R^8 is a hydrogen.

3. The precatalyst of claim 1 or 2, wherein each of R^5 and R^{10} is flourine.

4. The precatalyst of any one of claims 1-3, wherein each of R^2 and R^{13} is a 1,1-dimethylethyl.

5. The precatalyst of any one of claims 1-4, wherein each of R^{15} and R^{16} is a 2,7-di-t-butlycarbazole or a 3,6-di-t-butlycarbazole.

6. The precatalyst of any one of claims 1-5, wherein L is a saturated C_3 alkylene.

7. The precatalyst of any one of claims 1-6, wherein each X is chlorine.

8. The precatalyst of any one of claims 1-7, further comprising a silica support that is free of activator, wherein the activator-free silica support supports the precatalyst.

9. A method of making a titanium biphenylphenol polymerization catalyst, the method comprising contacting, under activating conditions, a titanium biphenylphenol polymerization precatalyst of Formula I of any one of claims 1 to 8 with an activator so as to activate the titanium biphenylphenol polymerization precatalyst of Formula I, thereby making the titanium biphenylphenol polymerization catalyst.

10. The method of claim 9, further comprising:

contacting an activator-free solution of the titanium biphenylphenol polymerization precatalyst of Formula I dissolved in an alkane solvent with a silica support containing thereon a spray-dried activator to make the titanium biphenylphenol polymerization catalyst on a silica support.

11. A titanium biphenylphenol polymerization catalyst made by the method of claim 9 or 10.

12. A method of making a polyethylene, the method comprising:

polymerizing an olefin monomer in a single gas-phase polymerization reactor in presence of the titanium biphenylphenol polymerization catalyst of claim 11 to make a polyethylene composition.

13. The method of claim 12, before the polymerizing step, further comprising:

making the titanium biphenylphenol polymerization catalyst; and

feeding the titanium biphenylphenol polymerization catalyst into the single gas-phase polymerization reactor.