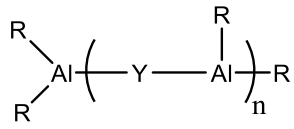
What is claimed is:

1. A composition of formula (I):



(I), wherein:

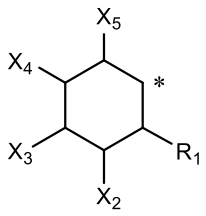
n is a number from 1 to 100;

Y is a linking group composed of a linear, branched, or cyclic C_4 to C_{100} hydrocarbylene group that optionally includes at least one heteroatom and that is aliphatic or aromatic, wherein Y comprises two points of attachment to Al atoms and at least one of the two points of attachment is $–CH_2–$;

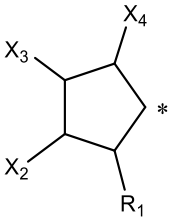
each R group is independently a substituted or unsubstituted aryl group or a substituted or unsubstituted cyclic alkyl group containing, optionally, at least one heteroatom; and

two R groups attached to the same Al can be optionally covalently linked together.

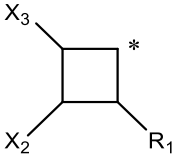
2. The composition of Claim 1, wherein each R group is independently selected from the group consisting of the following structures CG1 to CG4:



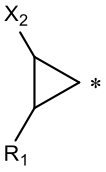
(CG1),



(CG2),



(CG3), and



(CG4),

wherein:

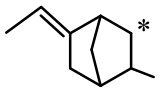
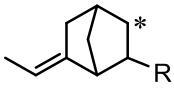
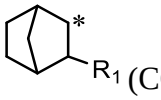
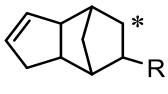
each R_1 is independently hydrogen or a C_1 to C_{20} alkyl group;

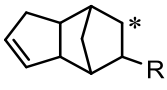
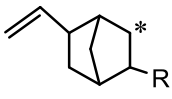
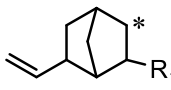
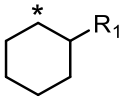
each X_2, X_3, X_4, and X_5 is independently hydrogen, a substituted or unsubstituted C_1 to C_{20} alkyl, alkylene or alkylidene group, or a substituted or unsubstituted C_6 to C_{20} aryl group;

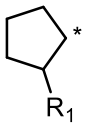
each X_2, X_3, X_4, and X_5 optionally includes at least one heteroatom; and

in each of structures CG1 to CG3, two of the groups selected from X_2, X_3, X_4, and X_5 may optionally join to form cyclic structures.

3. The composition of Claim 1or 2, wherein each R group is independently selected from the group consisting of the following structures CG5 to CG13:

 (CG5),  (CG6),  (CG7),  (CG8),

 (CG9),  (CG10),  (CG11),  (CG12),

and  (CG13),

wherein each R_1 is independently hydrogen or a C_1 to C_{20} alkyl group.

4. The composition of any of the preceding claims, wherein each R group is CG5 or CG12.

5. The composition of any of the preceding claims, wherein Y has the formula (II):

$-CH_2CH_2(CHR_2)_mCH_2CH_2-$ (II),

wherein:

R_2 is hydrogen or a C_1 to C_{20} alkyl or aryl group; and

m is a number from 0 to 20.

6. The composition of any of claims 1-4, wherein Y has the formula (III):

$-CH_2CH_2-Z-CH_2CH_2-$ (III),

wherein:

Z is a C_4 to C_{100} hydrocarbylene group comprising at least one aliphatic or aromatic ring and, optionally, includes at least one heteroatom.

7. The composition of any of the preceding claims, wherein Y is a derivative of a linking agent selected from the group consisting of 1,9-decadiene, 1,4-pentadiene, divinylbenzene, divinyldiphenylsilane, divinyldimethylsilane, 1,4-bis(dimethyl(vinyl)silyl)benzene, 1,5-bis(dimethyl(vinyl)silyl)pentane, and 1,3-divinylcyclopentane.

8. The composition of any of the preceding claims, wherein n is a number from 1 to 10.

9. The composition of claim 8, wherein n is a number from 1 to 3.

10. A process for preparing a composition, the process comprising:

(a) combining an aluminum compound, a linking agent, a capping agent, and an optional solvent at a temperature of from 50 °C to 200 °C for a time from 30 minutes to 200 hours, and

(b) obtaining the composition, wherein:

the aluminum compound has the formula $Al(J)_3$, wherein each J group is independently hydrogen, a substituted or unsubstituted alkyl group, or a substituted or unsubstituted aryl or heteroaryl group, wherein at least one J group is a hydrogen or an acyclic alkyl group and, optionally, two J groups can be covalently linked together;

the linking agent is a C_4 to C_{100} hydrocarbon comprising either at least two vinyl groups or a vinyl group and a cyclic olefin group and, optionally, includes at least one heteroatom; and

the capping agent is a substituted or unsubstituted cyclic olefin.