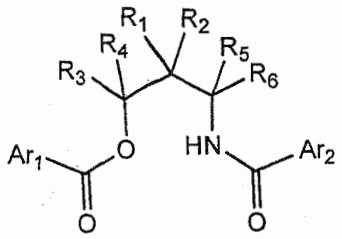
CLAIMS

1. A halogenated amide ester having the structure (I):



(I)

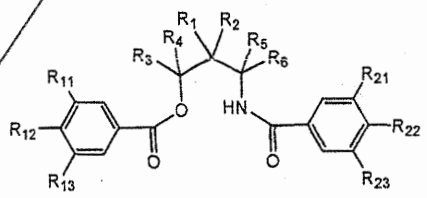
wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from the group consisting of hydrogen, a halogen, and an acyclic alkyl group having 1-20 carbon atoms, and at least one of R_1-R_6 is an acyclic alkyl group; and

Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from the group consisting of an aryl group having 6-20 carbon atoms, and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenated.

2. The halogenated amide ester of claim 1 wherein each of Ar_1 and Ar_2 is selected from the group consisting of a phenyl group, a naphthyl group, an anthracenyl group, and a phenanthrenyl group.

3. The halogenated amide ester of any of claims 1-2 wherein at least two of R_1-R_6 are an acyclic alkyl group having 1-6 carbon atoms.

4. The halogenated amide ester of any of claims 1-3 having the structure (II)



(II)

wherein at least one of R_{11}-R_{13} and at least one of R_{21}-R_{23} is a halogen.

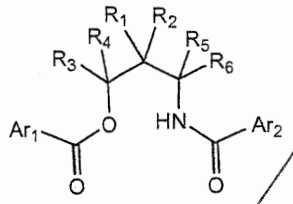
5. The halogenated amide ester of claim 4 wherein each of R_{12} and R_{22} is selected from the group consisting of chlorine and fluorine.

6. The halogenated amide ester of any of claims 1-5 wherein each of R_1 and R_2 is a hydrocarbyl group having 1 to 6 carbon atoms.

7. The halogenated amide ester of any of claims 1-6 wherein each of R_3 and R_5 is a hydrocarbyl group having 1 to 6 carbon atoms.

8. A procatalyst composition comprising:

a combination of a magnesium moiety precursor selected from the group consisting of anhydrous magnesium chloride, an alcohol adduct of magnesium chloride, magnesium alkoxide, magnesium aryloxide, mixed magnesium alkoxy halide, carbonated magnesium dialkoxide and carbonated magnesium aryloxide, a titanium halide and an internal electron donor comprising a halogenated amide ester, having the structure (I)

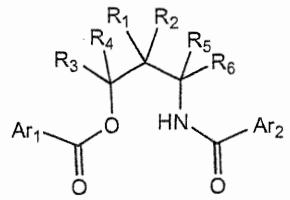


(I)

wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from the group consisting of hydrogen, a halogen, and an acyclic alkyl group having 1-20 carbon atoms, and at least one of R_1-R_6 is an acyclic alkyl group; and

Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from the group consisting of an aryl group having 6-20 carbon atoms, and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenated.

9. The procatalyst composition of claim 8 wherein the halogenated amide ester has the structure (I)



(I)

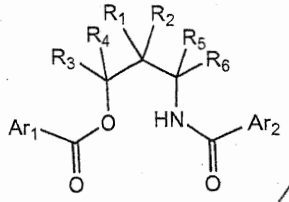
wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from the group consisting of hydrogen, halogen, a hydrocarbyl group having 1-20 carbon atoms, and a substituted hydrocarbyl group having 1-20 carbon atoms; and

Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from the group consisting of an aryl group having 6-20 carbon atoms and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenated.

10. The procatalyst composition of any of claims 8-9 comprising a benzoate.

11. A catalyst composition comprising;

a procatalyst composition comprising an internal electron donor comprising a halogenated amide ester having the structure (I)



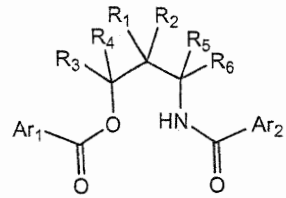
(I)

wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from the group consisting of hydrogen, a halogen, and an acyclic alkyl group having 1-20 carbon atoms, and at least one of R_1-R_6 is an acyclic alkyl group; and

Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from the group consisting of an aryl group having 6-20 carbon atoms, and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenated;

and a cocatalyst.

12. The catalyst composition of claim 11 wherein the halogenated amide ester has the structure (I)



(I)

wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from the group consisting of hydrogen, halogen, a hydrocarbyl group having 1-20 carbon atoms, and a substituted hydrocarbyl group having 1-20 carbon atoms; and

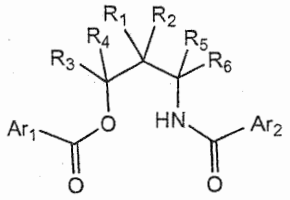
Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from the group consisting of an aryl group having 6-20 carbon atoms and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenated.

13. The catalyst composition of any of claims 11-12 comprising an external electron donor selected from the group consisting of a silicon compound, a bidentate compound, a diether, a diol ester, a carboxylate, an amine, a phosphite, and combinations thereof.

14. The catalyst composition of any of claims 11-13 comprising an activity limiting agent selected from the group consisting of a carboxylic acid ester, a diether, a diol ester, and combinations thereof.

15. A process for producing an olefin-based polymer comprising:

contacting, under polymerization conditions, an olefin with a catalyst composition comprising a halogenated amide ester having a structure (I)



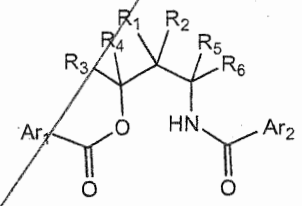
(I)

wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from the group consisting of hydrogen, a halogen, and an acyclic alkyl group having 1-20 carbon atoms, and at least one of R_1-R_6 is an acyclic alkyl group; and

Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from the group consisting of an aryl group having 6-20 carbon atoms, and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenated; and

forming an olefin-based polymer comprising the halogenated amide ester.

16. The process of claim 15 wherein the halogenated amide ester has the structure (I)



(I)

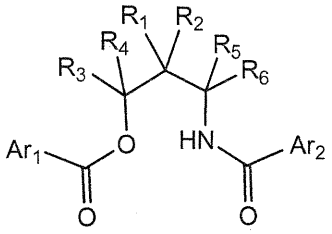
wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from the group consisting of hydrogen, halogen, a hydrocarbyl group having 1-20 carbon atoms, and a substituted hydrocarbyl group having 1-20 carbon atoms; and

Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from the group consisting of an aryl group having 6-20 carbon atoms and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenated.

17. The process of any of claims 15 or 16 wherein the olefin is propylene, the process comprising forming a propylene-based polymer having a polydispersity index from about 5.0 to about 20.0.

CLAIMS

1. A halogenated amide ester having the structure (I):



(I)

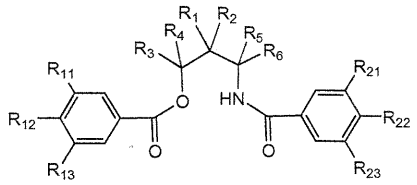
wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from a group consisting of hydrogen, a halogen, and an acyclic alkyl group having 1-20 carbon atoms, and at least one of R_1-R_6 is an acyclic alkyl group; and

Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from a group consisting of an aryl group having 6-20 carbon atoms and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenated.

2. The halogenated amide ester of claim 1, wherein each of Ar_1 and Ar_2 is selected from the group consisting of a phenyl group, a naphthyl group, an anthracenyl group, and a phenanthrenyl group.

3. The halogenated amide ester of claim 1, wherein at least two of R_1-R_6 are an acyclic alkyl group having 1-6 carbon atoms.

4. The halogenated amide ester of claim 1 having the structure (II)



(II)

wherein R_{11}-R_{13} and R_{21}-R_{23} are hydrogen, and at least one of R_{11}-R_{13} and at least one of R_{21}-R_{23} is a halogen.

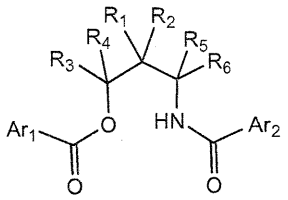
5. The halogenated amide ester of claim 4, wherein each of R_{12} and R_{22} is selected from the group consisting of chlorine and fluorine.

6. The halogenated amide ester of claim 1, wherein each of R_1 and R_2 is a hydrocarbyl group having 1 to 6 carbon atoms.

7. The halogenated amide ester of claim 1, wherein each of R_3 and R_5 is a hydrocarbyl group having 1 to 6 carbon atoms.

8. A procatalyst composition comprising:

a combination of a magnesium moiety, a titanium moiety and an internal electron donor comprising a halogenated amide ester of structure (I)



(I)

wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from a group consisting of hydrogen, a halogen, a hydrocarbyl group having 1-20 carbon atoms, and a substituted hydrocarbyl group having 1-20 carbon atoms; and

Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from a group consisting of an aryl group having 6-20 carbon atoms and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenated.

9. The procatalyst composition of claim 8 comprising a benzoate.

10. A catalyst composition comprising;

a procatalyst composition of claim 8; and

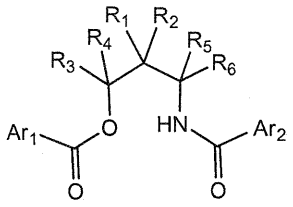
a cocatalyst.

11. The catalyst composition of claim 10 comprising an external electron donor selected from the group consisting of a silicon compound, a bidentate compound, a diether, a diol ester, a carboxylate, an amine, a phosphite, and combinations thereof.

12. The catalyst composition of claim 10 comprising an activity limiting agent selected from the group consisting of a carboxylic acid ester, a diether, a diol ester, and combinations thereof.

13. A process for producing an olefin-based polymer comprising:

contacting, under polymerization conditions, an olefin with a catalyst composition comprising a halogenated amide ester of structure (I):



(I)

wherein R_1-R_6 are the same or different, each of R_1-R_6 is selected from a group consisting of hydrogen, a halogen, a hydrocarbyl group having 1-20 carbon atoms, and a substituted hydrocarbyl group having 1-20 carbon atoms; and

Ar_1 and Ar_2 are the same or different and each of Ar_1 and Ar_2 is selected from a group consisting of an aryl group having 6-20 carbon atoms and an arylalkyl group having 7-20 carbon atoms, and at least one of Ar_1 and Ar_2 is halogenate; and

forming an olefin-based polymer comprising the halogenated amide ester.

14. The process of claim 13 wherein the olefin is propylene and the process comprises forming a propylene-based polymer having a polydispersity index from about 5.0 to about 20.0.