catalyst compositions and polymerization processes. The adamantane-based catalyst compositions of the present disclosure produce propylene-based olefins with high isotacticity and broad molecular weight distribution.

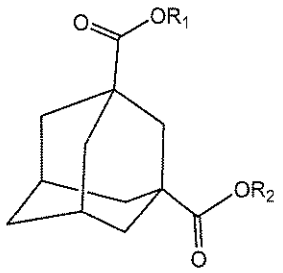
[0004a] In a first aspect, there is provided a catalyst composition comprising: a combination of a magnesium moiety, a titanium moiety and an internal electron donor comprising an adamantane dicarboxylate; and a cocatalyst.

[0005] In an embodiment, a process for producing a procatalyst composition is provided. The process includes reacting an adamantane-based compound, a procatalyst precursor, and a halogenating agent. The reaction occurs in a reaction mixture. The process includes forming a procatalyst composition by way of halogenation. The procatalyst composition includes an internal electron donor composed of an adamantanedicarboxylate.

[0006] In an embodiment, a procatalyst composition is provided. The procatalyst composition includes a combination of a magnesium moiety, a titanium moiety and an internal electron donor. The internal electron donor includes an adamantanedicarboxylate. The magnesium moiety and/or the titanium moiety may be a respective halide.

[0007] In an embodiment, the adamantanedicarboxylate has the structure (III):

(III)



[0008] wherein R_1-R_2 are the same or different. Each of R_1 and R_2 is selected from a substituted hydrocarbyl group having 1 to 20 carbon atoms, an unsubstituted hydrocarbyl group having 1 to 20 carbon atoms, and combinations thereof.

[0009] The present disclosure provides another procatalyst composition. In an embodiment, a procatalyst composition is provided which includes a combination of a magnesium moiety, a titanium moiety and a mixed internal electron donor. The mixed internal electron donor includes an adamantanedicarboxylate and an electron donor component.

[0010] In an embodiment, the electron donor component is selected from a benzoate, a phthalate, a diether, a silyl diol ester, a diol ester, a succinate, and combinations thereof.

[0011] The present disclosure provides a catalyst composition. The catalyst composition includes a procatalyst composition and a cocatalyst. The procatalyst composition includes an adamantanedicarboxylate. In another embodiment, the catalyst composition can include a mixed internal electron donor. The mixed internal electron donor includes an adamantanedicarboxylate and an electron donor component as disclosed above.

[0012] In an embodiment, the catalyst composition includes an external electron donor, a mixed external electron donor and/or an activity limiting agent.

[0012a] In a second aspect, there is provided a process for producing an olefin-based polymer comprising: contacting, under polymerization conditions, an olefin with a catalyst composition comprising an adamantane dicarboxylate and a cocatalyst; and forming an olefin-based polymer.

[0013] The present disclosure provides a process for producing an olefin-based polymer. In an embodiment, a process is provided which includes contacting, under polymerization conditions, an olefin with a catalyst composition. The catalyst composition includes an adamantanedicarboxylate. The process further includes forming an olefin-based polymer.

[0014] In an embodiment, the olefin is propylene. The process includes forming a propylene-based polymer having a polydispersity index from about 5.0 to about 15.0.

[0015] In an embodiment, the olefin is propylene. The process includes forming a propylene-based polymer having a melt flow rate from about 0.01 g/10 min to about 800 g/10 min.

[0016] The present disclosure provides another process for producing an olefin-based polymer. In an embodiment, a process for producing an olefin-based polymer is provided which includes contacting propylene with a catalyst composition comprising an adamantanedicarboxylate to form a propylene-based polymer. The contact between the propylene and the catalyst composition occurs in a first polymerization reaction under polymerization conditions. The process further includes contacting ethylene and optionally at least one other olefin in the presence of the propylene-based polymer. The contact between the ethylene, the olefin(s), and the propylene-based polymer occurs in a second polymerization reactor under polymerization conditions and forms a propylene impact copolymer.

[0017] An advantage of the present disclosure is the provision of an improved procatalyst composition.

[0018] An advantage of the present disclosure is the provision of an improved catalyst composition for the polymerization of olefin-based polymers.