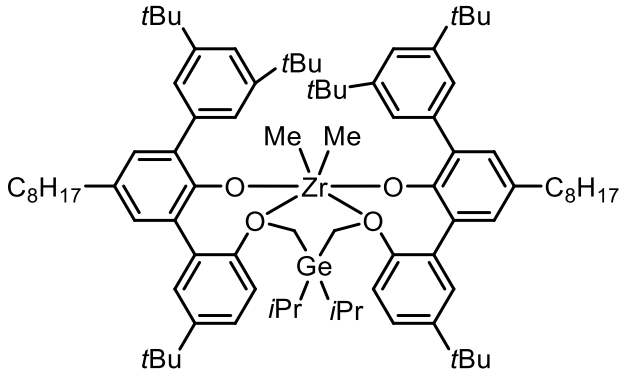
weight (greater than 1,000,000 g/mol) and a narrow molecular weight distribution (MWD less than 3.0).

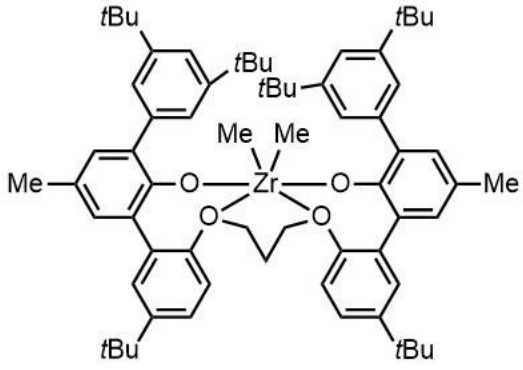
SUMMARY

[0004] The present disclosure provides a process. The process includes contacting, under polymerization conditions, one or more C_6-C_{14} α-olefin monomers with a bis-biphenylphenoxy catalyst. The process includes forming a polymer composed of one or more C_6-C_{14} α-olefin monomers, and having an absolute weight average molecular weight ($Mw_{(abs)}$) greater than 1,300,000 g/mol and a $Mw_{(abs)}/Mn_{(abs)}$ from 1.3 to 3.0.

[0004a] In one aspect, the present disclosure provides a process comprising: contacting, under polymerization conditions, one or more C_6-C_8 α-olefin monomers with a bis-biphenylphenoxy catalyst having the formula (V):



or having the formula (VI):



;

and forming a polymer composed of one or more C_6-C_8 α-olefin monomers, wherein the polymer formed is a homopolymer of one monomer selected from C_6-C_8 α-olefin monomers, a copolymer with two monomers selected from C_6-C_8 α-olefin monomers, or a terpolymer with three monomers selected from C_6-C_8 α-olefin monomers, and having an absolute weight average

molecular weight ($Mw_{(abs)}$) greater than 1,300,000 g/mol and a $Mw_{(abs)}/Mn_{(abs)}$ from 1.3 to 3.0, a residual amount of zirconium and in addition a residual amount of germanium when the catalyst is formula (V), wherein a residual amount is from greater than 0 ppm to less than 300 ppm.

[0005] The present disclosure provides a composition. The composition includes a polymer composed of one or more C_6-C_{14} α-olefin monomers. The polymer includes a residual amount of zirconium and the polymer has an absolute weight average molecular weight ($Mw_{(Abs)}$) greater than 1,300,000 g/mol and a $Mw_{(Abs)}/ Mn_{(Abs)}$ from 1.3 to 3.0.

[0005a] In another aspect, the present disclosure provides a composition comprising: a polymer consisting of one or more C_6-C_{14} α-olefin monomers, the polymer comprising boron; and a residual amount of zirconium, the polymer having an absolute weight average molecular weight ($Mw_{(Abs)}$) greater than 1,300,000 g/mol and a $Mw_{(Abs)}/ Mn_{(Abs)}$ from 1.3 to 3.0, wherein the polymer comprises from greater than 0 ppm to 300 ppm zirconium.

DEFINITIONS

[0006] Any reference to the Periodic Table of Elements is that as published by CRC Press, Inc., 1990–1991. Reference to a group of elements in this table is by the new notation for numbering groups.

[0007] For purposes of United States patent practice, the contents of any referenced patent, patent application or publication are incorporated by reference in their entirety (or its equivalent US version is so incorporated by reference) especially with respect to the disclosure of definitions (to the extent not inconsistent with any definitions specifically provided in this disclosure) and general knowledge in the art.

[0008] The numerical ranges disclosed herein include all values from, and including, the lower and upper value. For ranges containing explicit values (*e.g.*, 1 or 2, or 3 to 5, or 6, or 7), any subrange between any two explicit values is included (*e.g.*, the range 1-7 above includes subranges of 1 to 2; 2 to 6; 5 to 7; 3 to 7; 5 to 6; etc.).

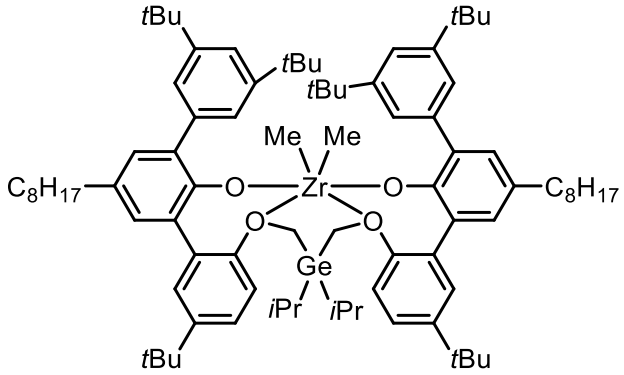
[0009] Unless stated to the contrary, implicit from the context, or customary in the art, all parts and percents are based on weight and all test methods are current as of the filing date of this disclosure.

[0010] The terms "blend" or "polymer blend," as used herein, is a blend of two or more

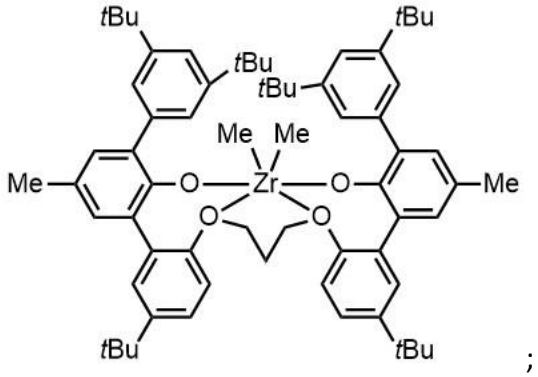
CLAIMS

1. A process comprising:

contacting, under polymerization conditions, one or more C_6-C_8 α-olefin monomers with a bis-biphenylphenoxy catalyst having the formula (V):



or having the formula (VI):



;

and

forming a polymer composed of one or more C_6-C_8 α-olefin monomers, wherein the polymer formed is a homopolymer of one monomer selected from C_6-C_8 α-olefin monomers, a copolymer with two monomers selected from C_6-C_8 α-olefin monomers, or a terpolymer with three monomers selected from C_6-C_8 α-olefin monomers, and having an absolute weight average molecular weight ($Mw_{(abs)}$) greater than 1,300,000 g/mol and a $Mw_{(abs)}/Mn_{(abs)}$ from 1.3 to 3.0, a residual amount of zirconium and in addition a residual amount of germanium when the catalyst is formula (V), wherein a residual amount is from greater than 0 ppm to less than 300 ppm.

2. The process of claim 1 comprising contacting, under polymerization conditions, one or more C_6-C_8 α-olefin monomers with a bis-biphenylphenoxy catalyst having the formula (V) or

the formula (VI); and

forming a polymer composed of one or more C_6-C_8 α-olefin monomers, the polymer comprising a residual amount of zirconium and having an absolute weight average molecular weight ($Mw_{(Abs)}$) greater than 1,300,000 g/mol and a $Mw_{(Abs)}$/ $Mn_{(Abs)}$ from 1.3 to 3.0.

3. The process of claim 2 comprising contacting, under polymerization conditions, octene monomer with a bis-biphenylphenoxy catalyst having the formula (V) or the formula (VI); and

forming an octene homopolymer comprising a residual amount of zirconium and having an absolute weight average molecular weight ($Mw_{(Abs)}$) greater than 1,300,000 g/mol and a $Mw_{(Abs)}$/ $Mn_{(Abs)}$ from 1.3 to 3.0.

4. The process of claim 3 comprising contacting, under polymerization conditions, octene monomer with a bis-biphenylphenoxy catalyst having the formula (V); and

forming an octene homopolymer comprising a residual amount of germanium and having an absolute weight average molecular weight ($Mw_{(Abs)}$) greater than 1,300,000 g/mol and a $Mw_{(Abs)}$/ $Mn_{(Abs)}$ from 1.3 to 3.0.

5. The process of claim 1 wherein the catalyst is of formula (V), the zirconium is present in an amount of from 30 ppm to 160 ppm, and the germanium is present in an amount of from 14 ppm to 125 ppm.

6. The process of claim 1 wherein the catalyst is of formula (VI) and the zirconium is present in an amount of from 30 ppm to 160 ppm.

7. A composition comprising:

a polymer consisting of one or more C_6-C_{14} α-olefin monomers, the polymer comprising boron; and

a residual amount of zirconium, the polymer having an absolute weight average molecular weight ($Mw_{(Abs)}$) greater than 1,300,000 g/mol and a $Mw_{(Abs)}$/ $Mn_{(Abs)}$ from 1.3 to 3.0,

wherein the polymer comprises from greater than 0 ppm to 300 ppm zirconium.

8. The composition of claim 7 wherein the polymer comprises 0 ppm titanium.

9. The composition of claim 7 or 8 wherein the polymer comprises from greater than 0 ppm to 300 ppm germanium.

10. The composition of any of claims 7-9 wherein the polymer is selected from the group consisting of octene homopolymer and hexene homopolymer.

11. The composition of claim 5 wherein the polymer comprises from 30 pm to 160 ppm zirconium.