WO2005/090426, WO2005/090427 and WO2007/035489. In chain shuttling, block copolymers may be produced by shuttling a growing polymer chain between two or more catalysts in a given reactor environment whereby each catalyst makes a type of polymer that is distinct in composition. The catalysts can make polymers which differ in the amount or type of comonomer incorporated therein, the density, the amount of crystallinity, the crystallite size attributable to a polymer of such composition, the type or degree of tacticity (isotactic or syndiotactic), regio-regularity or regio-irregularity, the amount of branching, including long chain branching or hyper-branching, the homogeneity, or any other chemical or physical property. The shuttling mechanism employs one or more shuttling agents, which do not make polymer, but serve to transfer the polymer between active catalyst sites. Alternatively, chain shuttling may be employed to produce a block copolymer by employing two or more reactors in series. In this case, the shuttling agent acts to extend the average life of a growing polymer chain such that the polymer chains experience chain growth in each reactor before termination. The composition of each of the polymer blocks is determined by the catalyst(s) and the reactor conditions.

SUMMARY ~~OF THE INVENTION~~

[11] Compositions are disclosed comprising:

A) a crystalline polyalphaolefin, polypropylene or a propylene copolymer,

B) an ethylene-based crystalline polymer, and

C) at least one crystalline block composite comprising:

i) a crystalline ethylene based polymer;

ii) a crystalline alpha-olefin based polymer and

iii) a block copolymer comprising a crystalline ethylene block and a crystalline alpha-olefin block.

[11a] In a first aspect, there is provided a composition comprising: A) a first polyalphaolefin selected from crystalline polyalphaolefin, polypropylene and a propylene copolymer, B) a first crystalline ethylene based polymer that is a high density polyethylene, and C) at least one crystalline block composite comprising: i) a second crystalline ethylene based polymer; ii) a second polyalphaolefin that is a crystalline propylene based polymer and iii) a block copolymer comprising a crystalline ethylene block and a crystalline propylene block wherein the crystalline ethylene block of the block copolymer is the same composition as the crystalline ethylene based polymer in the block composite and the crystalline propylene block of the block copolymer is the same composition as the crystalline propylene based polymer of the block composite and wherein the propylene monomer of the crystalline propylene based polymer and the crystalline propylene based polymer and the crystalline propylene block is present in an amount greater than 90 mol %; and, wherein component C) is present in an amount of from 0.5 wt% to 15 wt% based on total weight of the composition.

BRIEF DESCRIPTION OF THE DRAWINGS

[12] Figure 1 shows FTREF analysis of CBC1.

[13] Figure 2 shows a general graphical representation of the relationship between weight fraction of CAO in the polymer to CBCI.

[14] Figure 3 shows DSC curves for CBC1.

We claim:

1. A composition comprising:

A) a crystalline polyalphaolefin, polypropylene or a propylene copolymer,

B) a high density polyethylene, and

C) at least one crystalline block composite comprising:

i) a crystalline ethylene based polymer;

ii) a crystalline alpha-olefin based polymer and

iii) a block copolymer comprising a crystalline ethylene block and a crystalline alpha-olefin block.

2. The composition of Claim 1 wherein component A) is selected from the group consisting of polypropylene, polybutylene and poly(4-methylpentene).

3. The composition of Claim 1 or 2 wherein component B) is present in an amount greater than 45 wt% based on total weight of the composition.

4. The composition of any of the preceding claims wherein component C) is present in an amount of from 0.5 wt% to 15 wt% based on total weight of the composition.

5. The composition of any of the preceding claims wherein component C) has a Crystalline Block Composite Index of greater than 0.0 to 1.0.

6. The composition of any of the preceding claims wherein component C) has a Crystalline Block Composite Index of 0.1 to 0.9.

7. The composition of any of the preceding claims wherein the thermomechanical probe penetration temperature required to reach a depth of 200 μm for the composition is at least 10 °C higher than that with components A) and B) but lacking C).

8. The composition of any of the preceding claims wherein the Environmental Stress Crack Resistance, as measured according to ASTM D1693, is improved by more than 20% as compared to a composition of component B) but lacking A) and C).

9. The composition of any of the preceding claims wherein the clarity, as measured according to ASTM D1746 using 0.5mm compression molded films, is at least 10% greater than that with components A) and B) present but lacking C).

10. The composition of any of the preceding claims wherein the haze, as measured according to ASTM D1003, using 0.5 mm compression molded films, is at least 10% less than that with components A) and B) present but lacking C).

We claim:

1. A composition comprising:

A) a first polyalphaolefin selected from crystalline polyalphaolefin, polypropylene and a propylene copolymer,

B) a first crystalline ethylene based polymer that is a high density polyethylene, and

C) at least one crystalline block composite comprising:

i) a second crystalline ethylene based polymer;

ii) a second polyalphaolefin that is a crystalline propylene based polymer and

iii) a block copolymer comprising a crystalline ethylene block and a crystalline propylene block wherein the crystalline ethylene block of the block copolymer is the same composition as the crystalline ethylene based polymer in the block composite and the crystalline propylene block of the block copolymer is the same composition as the crystalline propylene based polymer of the block composite and wherein the propylene monomer of the crystalline propylene based polymer and the crystalline propylene based polymer and the crystalline propylene block is present in an amount greater than 90 mol %; and,

wherein component C) is present in an amount of from 0.5 wt% to 15 wt% based on total weight of the composition.

2. The composition of Claim 1 wherein component A) is selected from the group consisting of polypropylene, polybutylene and poly(4-methylpentene).

3. The composition of Claim 1 wherein component B) is present in an amount greater than 45 wt% based on total weight of the composition.

4. The composition of claim 1 wherein the thermomechanical probe penetration temperature required to reach a depth of 200 μm for the composition is at least 10 °C higher than that with components A) and B) but lacking C).

5. The composition of claim 1 wherein the Environmental Stress Crack Resistance, as measured according to ASTM D1693, is improved by more than 20% as compared to a composition of component B) but lacking A) and C).

6. The composition of claim 1 wherein the clarity, as measured according to ASTM D1746 using 0.5mm compression molded films, is at least 10% greater than that with components A) and B) present but lacking C).

7. The composition of claim 1 wherein the haze, as measured according to ASTM D1003, using 0.5 mm compression molded films, is at least 10% less than that with components A) and B) present but lacking C).