# POLYMERIC FORMULATION WITH DIRT PICK-UP RESISTANCE

## BACKGROUND

**[0001]** Resistance to dirt is important in applications where the finished product is exposed to contamination. Sources of contamination include, for example, soil, air pollution, toxic gases, hydrolysis or fluids, and chemicals. Applications such as textile architecture, roofing membranes, geo-membranes, industrial tank liners, industrial containers, industrial packaging, automotive dashboards—are some examples of end-products exposed to contamination.

**[0002]** Resistance to dirt (or contamination) is measured quantitatively as dirt pick-up resistance (or DPUR). Conventionally, materials such as polyolefins, achieve DPUR by (i) applying a special coating thereto (coating based on acrylic, polyurethane, fluoro-silane, polyvinyl dichloride, UV curing inks), and/or (ii) surface modification techniques (gas phase fluorination, electron beam grafting), and/or (iii) the use of surface modifiers (polydimethylsiloxanes, nano-silica).

**[0003]** The art recognizes the need for materials that have DPUR without the need for a coating or a secondary production process.

## SUMMARY

**[0004]** The present disclosure is directed to a polyolefin-based composition with improved DPUR achieved without the need for any of the described coatings or secondary production processes.

**[0005]** The present disclosure provides a composition. In an embodiment, the composition includes

A) an ethylene/acrylate interpolymer or an ethylene/acetate interpolymer;

B) an ethylene/α-olefin multi-block copolymer; and

C) a flame retardant.

**[0005a]** In one aspect, there is provided a composition comprising:

(A) from 5 wt% to 30 wt% of a grafted ethylene/acrylate interpolymer;

(B-1) from 15 wt% to 25 wt% of a first ethylene/α-olefin multi-block copolymer;

(B-2) from 10 wt% to 20 wt% of a second ethylene/α-olefin multi-block copolymer, the second ethylene/α-olefin multi-block copolymer different than the first ethylene/α-olefin multi-block copolymer; and

(C) from 40 wt% to 55 wt% flame retardant.

**[0006]** In an embodiment, the ethylene/acrylate interpolymer is a functionalized ethylene/acrylate interpolymer.

**[0007]** The present disclosure provides an article. The article contains the present composition.

**[0007a]** In another aspect, there is provided an article comprising the composition as defined herein.

**[0008]** In embodiment, the article is a roofing membrane. The roofing membrane includes at least one layer containing the present composition. The composition comprises

(A) from 5 wt% to 30 wt% of a grafted ethylene/acrylate interpolymer or an ethylene/acetate interpolymer;

(B-1) from 15 wt% to 25 wt% of a first ethylene/α-olefin multi-block copolymer;

(B-2) from 10 wt% to 20 wt% of a second ethylene/α-olefin multi-block copolymer, the second ethylene/α-olefin multi-block copolymer different than the first ethylene/α-olefin multi-block copolymer; and

(C) from 40 wt% to 55 wt% of a flame retardant.

**[0008a]** In another aspect, there is provided a roofing membrane comprising:

at least one layer containing a composition comprising

(A) from 5 wt% to 30 wt% of a grafted ethylene/acrylate interpolymer;

(B-1) from 15 wt% to 25 wt% of a first ethylene/α-olefin multi-block copolymer;

(B-2) from 10 wt% to 20 wt% of a second ethylene/α-olefin multi-block copolymer, the second ethylene/α-olefin multi-block copolymer different than the first ethylene/α-olefin multi-block copolymer; and

(C) from 40 wt% to 55 wt% of a flame retardant.

**[0008b]** In another aspect, there is provided a composition comprising;

(A) from 5 wt% to 30 wt% of an ethylene vinyl acetate copolymer;

(B-1) from 15 wt% to 25 wt% of a first ethylene/α-olefin multi-block copolymer;

(B-2) from 10 wt% to 20 wt% of a second ethylene/α-olefin multi-block copolymer, the second ethylene/α-olefin multi-block copolymer different than the first ethylene/α-olefin multi-block copolymer; and

(C) from 40 wt% to 55 wt% flame retardant.

**[0009]** An advantage of the present disclosure is a composition with improved dirt pick-up resistance (DPUR).

**[0010]** An advantage of the present disclosure is an article with improved DPUR.

**[0011]** An advantage of the present disclosure is a roofing membrane with improved DPUR.

DEFINITIONS

**[0012]** All references to the Periodic Table of the Elements herein shall refer to the Periodic Table of the Elements, published and copyrighted by CRC Press, Inc., 2003. Also, any references to a Group or Groups shall be to the Groups or Groups reflected in this Periodic Table of the Elements using the IUPAC system for numbering groups. Unless stated to the contrary, implicit from the context, or customary in the art, all parts and percents are based on weight. For purposes of United States patent practice, the contents of any patent, patent application, or publication referenced herein are hereby incorporated by reference in their entirety (or the equivalent US version thereof is so incorporated by reference), especially with respect to the disclosure of synthetic techniques, definitions (to the extent not inconsistent with any definitions provided herein) and general knowledge in the art.

**[0013]** The numerical ranges disclosed herein include all values from, and including, the lower value and the 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.*, 1 to 2; 2 to 6; 5 to 7; 3 to 7; 5 to 6; etc.).

**[0014]** 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.

CLAIMS

1. A composition comprising:

(A) from 5 wt% to 30 wt% of a grafted ethylene/acrylate interpolymer;

(B-1) from 15 wt% to 25 wt% of a first ethylene/α-olefin multi-block copolymer;

(B-2) from 10 wt% to 20 wt% of a second ethylene/α-olefin multi-block copolymer, the second ethylene/α-olefin multi-block copolymer different than the first ethylene/α-olefin multi-block copolymer; and

(C) from 40 wt% to 55 wt% flame retardant.

2. The composition of claim 1 wherein the composition has a dirt pick-up resistance (non-UV exposed) from 3.0 to 5.5.

3. The composition of any of claims 1 and 2 wherein the composition has a dirt pick-up resistance (UV exposed) from 3.0 to 5.1.

4. The composition of claim 1 wherein the grafted ethylene-based acrylate interpolymer is a maleic anhydride-grafted-ethylene/acrylate copolymer.

5. An article comprising the composition of any of claims 1 to 4.

6. A roofing membrane comprising:

at least one layer containing a composition comprising

(A) from 5 wt% to 30 wt% of a grafted ethylene/acrylate interpolymer;

(B-1) from 15 wt% to 25 wt% of a first ethylene/α-olefin multi-block copolymer;

(B-2) from 10 wt% to 20 wt% of a second ethylene/α-olefin multi-block copolymer, the second ethylene/α-olefin multi-block copolymer different than the first ethylene/α-olefin multi-block copolymer; and

(C) from 40 wt% to 55 wt% of a flame retardant.

7. The roofing membrane of claim 6 wherein the composition has a dirt pick-up resistance (non-UV exposed) from 3.0 to 5.5.

8. The roofing membrane of any of claims 6-7 wherein the at least one layer is a top layer of the roofing membrane.

9. A composition comprising;

(A) from 5 wt% to 30 wt% of an ethylene vinyl acetate copolymer;

(B-1) from 15 wt% to 25 wt% of a first ethylene/α-olefin multi-block copolymer;

(B-2) from 10 wt% to 20 wt% of a second ethylene/α-olefin multi-block copolymer, the second ethylene/α-olefin multi-block copolymer different than the first ethylene/α-olefin multi-block copolymer; and

(C) from 40 wt% to 55 wt% flame retardant.

10. The composition of claim 9 wherein the composition has a dirt pick-up resistance (non-UV exposed) from 3.0 to 5.5.

11. An article comprising the composition of any of claims 9-10.