[0005] The present disclosure is directed to polyethylene compositions that may exhibit desirable stiffness without inhibiting performance properties, such as ESCR. As such, the present disclosure may provide a polyethylene composition that, when utilized in the production of polymeric articles, may allow for reduced material costs resulting from said balance of stiffness and ESCR properties.

[0006] According to one or more examples, a polyethylene composition is provided. The polyethylene compositions may include a first polyethylene fraction area defined by an area in the elution profile in a temperature range of 70°C to 97°C via improved comonomer composition distribution (iCCD) analysis method; a first peak in the temperature range of 70°C to 97°C in the elution profile; a second polyethylene fraction area defined by an area in the elution profile in a temperature range of 97°C to 110°C; and a second peak in the temperature range of 97°C to 110°C. The polyethylene composition may have a density of 0.935 g/cm^3 to 0.955 g/cm^3 and a melt index (I_2) of 1.0 g/10 minutes to 10.0 g/10 minutes. A ratio of the first polyethylene fraction area to the second polyethylene fraction area may be less than 2.0.

[0006a] According to one aspect, there is provided a polyethylene composition comprising: a first polyethylene fraction area defined by an area in the elution profile via improved comonomer composition distribution (iCCD) analysis method in a temperature range of 70°C to 97°C; a first peak in the temperature range of 70°C to 97°C in the elution profile; a second polyethylene fraction area defined by an area in the elution profile in a temperature range of 97°C to 110°C; and a second peak in the temperature range of 97°C to 110°C in the elution profile; and wherein the polyethylene composition has a density of 0.935 g/cm^3 to 0.955 g/cm^3, a melt index (I_2) of 1.0 g/10 minutes to 10.0 g/10 minutes, and wherein a ratio of the first polyethylene fraction area to the second polyethylene fraction area is less than 2.0; and wherein the polyethylene composition has an overall molecular weight determined by iCCD ($Mw_{(iCCD)}$), the first polyethylene fraction has a first fraction molecular weight determined by iCCD ($Mw_{(iCCD,\ 70°C–97°C)}$), and a ratio of the overall molecular weight ($Mw_{(iCCD)}$) to the first fraction molecular weight ($Mw_{(iCCD,\ 70°C–97°C)}$) is less than 0.9.

CLAIMS

1. A polyethylene composition comprising:

a first polyethylene fraction area defined by an area in the elution profile via improved comonomer composition distribution (iCCD) analysis method in a temperature range of 70°C to 97°C;

a first peak in the temperature range of 70°C to 97°C in the elution profile;

a second polyethylene fraction area defined by an area in the elution profile in a temperature range of 97°C to 110°C; and

a second peak in the temperature range of 97°C to 110°C in the elution profile; and

wherein the polyethylene composition has a density of 0.935 g/cm^3 to 0.955 g/cm^3, a melt index (I_2) of 1.0 g/10 minutes to 10.0 g/10 minutes, and wherein a ratio of the first polyethylene fraction area to the second polyethylene fraction area is less than 2.0; and

wherein the polyethylene composition has an overall molecular weight determined by iCCD ($Mw_{(iCCD)}$), the first polyethylene fraction has a first fraction molecular weight determined by iCCD ($Mw_{(iCCD,\ 70°C–97°C)}$), and a ratio of the overall molecular weight ($Mw_{(iCCD)}$) to the first fraction molecular weight ($Mw_{(iCCD,\ 70°C–97°C)}$) is less than 0.9.

2. The polyethylene composition of claim 1, wherein the polyethylene composition has a molecular weight distribution, expressed as the ratio of the weight average molecular weight to number average molecular weight ($Mw_{(GPC)}/Mn_{(GPC)}$) in the range of from 2.0 to 4.5.

3. The polyethylene composition of claim 1 or 2, wherein the second polyethylene fraction area comprises from 30% to 80% of the total area of the elution profile

4. The polyethylene composition of any preceding claim, wherein the polyethylene composition has a composition distribution breadth index 50 (CDBI50) of less than or equal to 50%.

5. The polyethylene composition of any preceding claim, wherein the polyethylene

composition has a zero shear viscosity ratio of less than 2.0.

6. The polyethylene composition of any preceding claim, wherein the polyethylene composition has an Environmental Stress Crack Resistance (ESCR) F50 (10%, A) of greater than 300 hours when measured according to D1693.

7. A polyethylene composition comprising:

a first polyethylene fraction in a temperature range of 70°C to 97°C in an elution profile via improved comonomer composition distribution (iCCD) analysis method, the first polyethylene fraction comprising a first peak, and wherein the first polyethylene fraction has a first fraction molecular weight determined by iCCD ($Mw_{(iCCD,\ 70°C–97°C)}$); and

a second polyethylene fraction in a temperature range of 97°C to 110°C in the elution profile, the second polyethylene fraction comprising a second peak;

wherein the polyethylene composition has an overall molecular weight determined by iCCD ($Mw_{(iCCD)}$), a density of 0.935 g/cm^3 to 0.955 g/cm^3, a melt index (I_2) of 1.0 g/10 minutes to 10.0 g/10 minutes; and

wherein and a ratio of the overall molecular weight ($Mw_{(iCCD)}$) to the first fraction molecular weight ($Mw_{(iCCD,\ 70°C–97°C)}$) is less than 0.9.

8. The polyethylene composition of claim 7, wherein the polyethylene composition has a molecular weight distribution, expressed as the ratio of the weight average molecular weight to number average molecular weight ($Mw_{(GPC)}/Mn_{(GPC)}$) in the range of from 2.0 to 4.5.

9. The polyethylene composition of any of claims 7–8, wherein the second polyethylene fraction area may comprise from 30% to 80% of the total area of the elution profile.

10. The polyethylene composition of any of claims 7–9, wherein the polyethylene composition has a CDBI50 of less than or equal to 50%.

11. The polyethylene composition of any of claims 7–10, wherein and a ratio of the first mass fraction to the second mass fraction is less than 2.0.

12. The polyethylene composition of any of claims 7–11, wherein the polyethylene composition has a zero shear viscosity ratio of less than 2.0.

13. The polyethylene composition of any of claims 7–12, wherein the polyethylene composition has an ESCR F50 (10%, A) of greater than 300 hours when measured according to D1693.

14. A method of producing a rotomolded article comprising the polyethylene composition of any preceding claim.