In one aspect, the present disclosure refers to a bimodal polyethylene, comprising: a density of from 0.930 to 0.950 gram/cubic centimeters (g/ccm); a melt index (I_2) of from 0.2 to 1.0 gram/10 minute; a melt flow ratio (I_{21}/I_2) of from 20 to 90; a polydispersity index (PDI) of from 12 to 30; wherein the bimodal polyethylene includes a high weight average molecular weight (HMW) polyethylene component and a low weight average molecular weight (LMW) polyethylene component characterized in which a chromatogram of a gel permeation chromatography (GPC) of the bimodal polyethylene displays a resolved bimodal weight average molecular weight distribution with a local minimum in a range of log (molecular weight) 3.5 to 5.5 between a peak representing the HMW polyethylene component and a peak representing the LMW polyethylene component.

Claims

What is claimed is:

1. A bimodal polyethylene, comprising:

a density of from 0.930 to 0.950 gram/cubic centimeters (g/ccm);

a melt index (I_2) of from 0.2 to 1.0 gram/10 minute;

a melt flow ratio (I_{21}/I_2) of from 20 to 90;

a polydispersity index (PDI) of from 12 to 30;

wherein the bimodal polyethylene includes a high weight average molecular weight (HMW) polyethylene component and a low weight average molecular weight (LMW) polyethylene component characterized in which a chromatogram of a gel permeation chromatography (GPC) of the bimodal polyethylene displays a resolved bimodal weight average molecular weight distribution with a local minimum in a range of log (molecular weight) 3.5 to 5.5 between a peak representing the HMW polyethylene component and a peak representing the LMW polyethylene component.

2. The bimodal polyethylene of claim 1, wherein a ratio of a height of the peak representing the HMW polyethylene component on the chromatogram of the bimodal polyethylene to the local minimum is from 1.2 to 3.0 (height of peak for HMW polyethylene component/local minimum).

3. The bimodal polyethylene of claim 2, wherein a ratio of a height of the peak representing the LMW polyethylene component on the chromatogram of the bimodal polyethylene to the local minimum is from 1.2 to 3.0 (height of peak for LMW polyethylene component/local minimum).

4. The bimodal polyethylene of claim 3, wherein a ratio of the height of the peak representing the LMW polyethylene component on the chromatogram of the bimodal polyethylene to the height of the peak representing the HMW polyethylene component on the chromatogram of the bimodal polyethylene is from 0.5 to 2.5 (height of LMW polyethylene component/(height of HMW polyethylene component).

5. The bimodal polyethylene of claim 1, wherein the bimodal polyethylene is a reaction product of a polymerization process performed in a single reactor and that employs a bimodal polymerization catalyst system comprising:

a bimodal catalyst system of bis(2-pentamethylphenylamido)ethyl)amine Zirconium dibenzyl and either (tetramethylcyclopentadienyl)(n-propylcyclopentadienyl)Zirconium dichloride or (tetramethylcyclopentadienyl)(n-propylcyclopentadienyl)zirconium dimethyl in a 3.0:1 molar ratio; and

a trim catalyst of (tetramethylcyclopentadienyl)(n-propylcyclopentadienyl)Zirconium dimethyl in an alkane solvent added to adjust melt flow ratio of the bimodal polyethylene.

6. The bimodal polyethylene of claim 5 wherein the polymerization process is a gas phase polymerization process.

7. The bimodal polyethylene of claim 1 characterized by raised temperature resistance measured on a compression molded plaque formed from the bimodal polyethylene, wherein the measurement is done in accordance with the requirements of ASTM F 1473 PENT test at a stress of 2.4 MPa and a temperature of 90 ^{o}C as per ASTM F2769-14.

8. The bimodal polyethylene of claim 1 characterized by raised temperature resistance as a PE-RT Type II material that when evaluated in accordance with ISO 9080 or equivalent, with internal pressure tests being carried out in accordance with ISO 1167-1 and ISO 1167-2, the bimodal polyethylene conforms to the 4-parameter model given in ISO 24033 for PE-RT Type II material over a range of temperature and internal pressure as provided in ISO 22391.

9. The bimodal polyethylene of claim 1, wherein the bimodal polyethylene has a ratio of the high weight average molecular weight component (Mw_{HMW}) to the low weight average molecular weight component (Mw_{LMW}) of the bimodal polyethylene that is from 20:1 to 100:1.

10. The bimodal polyethylene of claim 1,

wherein the high weight average molecular weight polyethylene component is present in an amount of 40 to 75 weight percent based on a total weight of the bimodal polyethylene; or

wherein the low weight average molecular weight polyethylene component is present in an amount of 25 to 60 weight percent based on a total weight of the bimodal polyethylene; or

wherein the low weight average molecular weight polyethylene component of the bimodal polyethylene has a weight average molecular weight (Mw) of 1,000 to 100,000; or

wherein the high weight average molecular weight polyethylene component of the bimodal polyethylene has a weight average molecular weight (Mw) of 10,000 to 1,000,000; or

wherein the polyethylene component has a flow index (I_{21}) of 10 to 20 g/10 minutes.