

CLAIMS

1. An ethylene-based polymer comprising:
a low molecular weight polymer fraction and a high molecular weight polymer, both derived from polymerized units of ethylene, one or more dienes, and optionally, one or more C₃–C₁₂ α -olefins;
the low molecular weight fraction and the high molecular weight fraction are divided by S_{max} on a molecular weight distribution (MWD) curve determined via absolute gel permeation chromatography, wherein S_{max} is the maximum absolute slope on the higher molecular weight side of the primary peak of the MWD curve, wherein the primary peak is the peak of greatest magnitude in the MWD curve;
wherein the low molecular weight polymer fraction and the high molecular weight polymer fraction each comprise a Ladder character, L, defined for a given absolute molecular weight (MW) as the fit of the log of the intrinsic viscosity $[\eta]$ versus the log of the absolute MW (M) curve using the expression,
 $\log[\eta] = \log(\beta) + \alpha \log(M) - L * \alpha \log(2)$ according to a Mark-Houwink-Sakurada curve, wherein $\log(\beta)$ is the intercept and α is the slope, and wherein
the low molecular weight polymer fraction has an MW below S_{max} and all values of L between -0.35 to 0.35; and
the high molecular weight polymer fraction has an MW above S_{max} and a maximum value of L between 0.8 and 1.5.
2. The ethylene-based polymer of claim 1, wherein the diene is unconjugated.
3. The ethylene-based polymer of claim 2, wherein the diene is acyclic.
4. The ethylene-based polymer of claim 3, wherein the diene comprises 1,4-pentadiene, 1,5-hexadiene, 1,6-heptadiene, 1,7-octadiene, 1,8-nonadiene, 1,9-decadiene, 1,10-undecadiene, 1,11-dodecadiene, dimethyldivinylsilane, dimethyldiallylsilane, dimethylallylvinylsilane.
5. The ethylene-based polymer of any preceding claim, wherein the high molecular weight polymer fraction comprises 0.5 to 30 % by weight of the polymer.

6. The ethylene-based polymer of claim 5, wherein the high molecular weight polymer fraction comprises between 1 and 15 % by weight of the polymer.
7. The ethylene-based polymer of any preceding claim, wherein all values L of the low molecular weight polymer fraction are between -0.2 to 0.2.
8. The ethylene-based polymer of any preceding claim, wherein the maximum value of L of the high molecular weight polymer fraction is from 0.9 to 1.1.
9. The ethylene-based polymer of any preceding claim, wherein the ethylene-based polymer has a molecular weight tail quantified by an MWD area metric, A_{TAIL} , and A_{TAIL} is greater than 0.06 as determined by gel permeation chromatography using a triple detector.
10. The ethylene-based polymer of claim 9, wherein A_{TAIL} is greater than 0.08.
11. The ethylene-based polymer of claim 10, wherein A_{TAIL} is greater than 0.10.
12. The ethylene-based polymer of any preceding claim, wherein the ethylene-based polymer has an average g' greater than 0.86, where the average g' is an intrinsic viscosity ratio determined by gel permeation chromatography using a triple detector.
13. The ethylene-based polymer of claim 12, wherein the average g' is greater than 0.88.
14. The ethylene-based polymer of claim 13, wherein the average g' is greater than 0.90.
15. The ethylene-based polymer of any preceding claim, wherein the ethylene-based polymer has a weight averaged molecular weight (M_w) of less than or equal to 250,000 Daltons, as determined by absolute gel permeation chromatography.
16. The ethylene-based polymer of claim 15, wherein the ethylene-based polymer has a weight averaged molecular weight (M_w) of less than or equal to 150,000 Daltons, as determined by absolute gel permeation chromatography.
17. The ethylene-based polymer of claim 16, wherein the ethylene-based polymer has a weight averaged molecular weight (M_w) of less than or equal to 100,000 Daltons, as determined by absolute gel permeation chromatography.

18. The ethylene-based polymer of any preceding claim, wherein the MI is greater than 0.1, wherein MI is the melt index in g/10min according to ASTM D1238.
19. The ethylene-based polymer of claim 18, wherein the MI is greater than 1, wherein MI is the melt index in g/10min according to ASTM D1238.
20. The ethylene-based polymer of claim 19, wherein the MI is greater than 2, wherein MI is the melt index in g/10min according to ASTM D1238.