CLAIMS

1. A process for preparing an ethylene polymer having a ratio of Mw/Mn of less than or equal to about 5, a ratio of Mz/Mw of less than or equal to about 2.3, and a zero-shear viscosity at 190^{o}C. of greater than or equal to about 8x10^{4} Pa-sec, the process comprising:

   contacting a base resin with a peroxide compound at a temperature in a range from about 120 to about 300^{o}C. to generate peroxide groups at about 10-50 ppm of peroxide groups based on the weight of the base resin.

2. The process of claim 1, wherein the step of contacting the base resin with the peroxide compound comprises melt processing a mixture of the base resin and the peroxide compound in a twin screw extrusion system.

3. The process of claim 2, wherein the base resin is produced using a metallocene-based catalyst system.

4. The process of claim 1, wherein the ethylene polymer has from about 0.008 to about 0.04 long chain branches (LCB) per 1000 total carbon atoms.

5. The process of claim 1, wherein:

   the ratio of Mw/Mn is in a range from about 2 to about 5;

   the ratio of Mz/Mw is a range from about 1.5 to about 2.3; and

   the zero-shear viscosity at 190 ^{o}C. is in a range from about 8x10^{4} to about 2x10^{6} Pa-sec.

6. The process of claim 5, wherein the ethylene polymer is an ethylene/α-olefin copolymer.

7. The process of claim 6, wherein the ethylene/α-olefin copolymer has:

a peak melting point in a range from about 100 to about 120°C.;

a difference between the peak melting point and the vicat softening temperature of less than or equal to about 18°C.;

a zero-shear viscosity at 190°C. in a range from about $1x10^5$ to about $1x10^6$ Pa-sec; and

a CY-a parameter at 190°C. in a range from about 0.08 to about 0.28.

8. The process of claim 5, wherein:

the ethylene polymer is an ethylene/α-olefin copolymer characterized by a peak melting point in a range from about 100 to about 120°C., and a difference between the peak melting point and the vicat softening temperature of less than or equal to about 18°C.; and

the base resin is characterized by a peak melting point in a range from about 100 to about 120°C., and a difference between the peak melting point and the vicat softening temperature of less than or equal to about 18°C.

9. The process of claim 5, wherein:

the ethylene polymer is an ethylene/α-olefin copolymer characterized by a zero-shear viscosity at 190°C. in a range from about $1x10^5$ to about $1x10^6$ Pa-sec, and a CY-a parameter at 190°C. in a range from about 0.08 to about 0.28; and

the base resin is characterized by a zero-shear viscosity at 190°C. in a range from about $2x10^3$ to about $7x10^4$ Pa-sec, and a CY-a parameter at 190°C. in a range from about 0.4 to about 0.8.

10. The process of claim 5, wherein:

the ethylene polymer has from about 0.009 to about 0.035 long chain branches (LCB) per 1000 total carbon atoms; and

the base resin has less than about 0.005 long chain branches (LCB) per 1000 total carbon atoms.

11. The process of claim 1, wherein the ethylene polymer has:

a ratio of Mw/Mn in a range from about 2.1 to about 3.5;

a ratio of Mz/Mw in a range from about 1.5 to about 2.2;

a melt index in a range from 0 to about 1; and

a zero-shear viscosity at 190^{o}C. in a range from about 1x10^{5} to about 1x10^{6} Pa-sec.

12. The process of claim 11, wherein the ethylene polymer has a CY-a parameter at 190^{o} C. in a range from about 0.1 to about 0.2.

13. The process of claim 11, wherein the ethylene polymer has from about 0.01 to about 0.03 long chain branches (LCB) per 1000 total carbon atoms.

14. The process of claim 11, wherein the ethylene polymer has a peak melting point in a range from about 105 to about 120^{o} C.

15. The process of claim 11, wherein the ethylene polymer is an ethylene/α-olefin copolymer with a density in a range from about 0.91 to about 0.92 g/cm^{3}.

16. The process of claim 15, wherein the ethylene/α-olefin copolymer is an ethylene/1-hexene copolymer.

17. The process of claim 11, wherein the base resin has:

a ratio of Mw/Mn in a range from about 2 to about 3.5;

a ratio of Mz/Mw in a range from about 1.5 to about 2.2; and

a melt index in a range from about 0.5 to about 2.

18. The process of claim 17, wherein the base resin has:

a zero-shear viscosity at 190^{o}C. in a range from about 3x10^{3} to about 2x10^{4} Pa-sec;

a CY-a parameter at 190^{o}C. in a range from about 0.5 to about 0.8; and less than about 0.005 long chain branches (LCB) per 1000 total carbon atoms.

19. The process of claim 1, wherein the ethylene polymer is an ethylene/1-hexene copolymer characterized by:

a ratio of Mw/Mn in a range from about 2 to about 3.5;

a ratio of Mz/Mw in a range from about 1.5 to about 2.2; and

a density in a range from about 0.905 to about 0.925 g/cm^{3}.

20. The process of claim 19, wherein the ethylene/1-hexene copolymer has:

a zero-shear viscosity at 190^{o}C. in a range from about 1x10^{5} to about 1x10^{6} Pa-sec;

a CY-a parameter at 190^{o}C. in a range from about 0.08 to about 0.28; and

from about 0.008 to about 0.04 long chain branches (LCB) per 1000 total carbon atoms.