CLAIMS

What is claimed is:

1. A method of forming a thermoplastic polymer film, the method comprising:

melting and subjecting a polymer resin material to shear stresses in a range of 250 kPa to 400 kPa to form a refined resin material and forming the thermoplastic polymer film from the refined resin material, wherein the film is free of microgels having a largest dimension greater than 50 microns, the film has a thickness in a range of 15 microns to 80 microns, and the film has a microgel count in a range of 0 to 0.2 per mm^2 of microgels having the maximum dimension greater than 10 microns.

2. The method according to claim 1 wherein the polymer resin material consists primarily of one or more polyolefins.

3. The method according to claim 1 wherein the polymer resin material consists primarily of polyethylene.

4. The method according to claim 1 further comprising:

mixing the polymer resin material with one or more antioxidants.

5. The method according to claim 1 wherein the polymer resin material is subjected to shear stresses in a range of 300 kPa to 375 kPa to form the refined resin material.

6. The method according to claim 1 further comprising:

extruding and solidifying the refined resin material.

7. The method according to claim 1 wherein the polymer resin material comprises at least a majority by weight of polyethylene, the method further comprising:

mixing the polymer resin material with one or more antioxidants; and

extruding and solidifying the refined resin material.

8. A method of forming a polymer film, the method comprising:

providing a polymer resin material consisting primarily of polyethylene;

mixing the polymer resin material with one or more antioxidants to form a resin material mixture;

melting and subjecting the resin material mixture to shear stresses in a range of 250 kPa to 400 kPa to form a refined resin material; and

extruding the refined resin material to form the polymer film, wherein the film is free of microgels having a largest dimension greater than 50 microns, the film has a thickness in a range of 15 microns to 80 microns, and the film has a microgel count in a range of 0 to 0.2 per mm^2 of microgels having the maximum dimension greater than 10 microns.

9. The method according to claim 8 further comprising:

prior to the action of extruding the refined resin material to form the polymer film, extruding and solidifying the refined resin material, and

melting and subjecting the extruded and solidified refined resin material to shear stresses less than 70 kPa.

10. The method according to claim 8 wherein the shear stresses are in a range of 300 kPa to 375 kPa.

11. The method according to claim 9 wherein the extruded and solidified refined resin material is in the form of extruded pellets.

12. A thermoplastic polymer film consisting essentially of polyethylene, the film being free of microgels having a maximum dimension greater than 50 microns, the film having a thickness in a range of 15 microns to 80 microns, the film having a microgel count in a range of 0 to 0.2 per mm^2 of microgels having the maximum dimension greater than 10 microns.

13. The thermoplastic polymer film according to claim 12, wherein the film has at least one nominally planar surface that is free of protrusions extending outward more than 1.0 micron from the nominal planar surface.

14. The thermoplastic polymer film according to claim 12, wherein the film has at least one nominally planar surface that is free of protrusions extending outward more than 0.5 microns from the nominal planar surface.

15. A multilayer thermoplastic polymer film comprising:

a release layer defining a first outer film surface; and

an adhesion layer defining a second outer film surface opposite the first outer film surface,

wherein at least one of the release layer and the adhesion layer consists essentially of polyethylene and is free of microgels having a maximum dimension greater than 50 microns, has a thickness in a range of 15 microns to 80 microns, and has a microgel count in a range of 0 to 0.2 per mm^2 of microgels having the maximum dimension greater than 10 microns.

16. The multilayer thermoplastic polymer film according to claim 15, wherein both the release layer and the adhesion layer consist essentially of polyethylene and are free of microgels having the maximum dimension greater than 50 microns.

17. The multilayer thermoplastic polymer film according to claim 15, wherein the film is free of protrusions extending outward more than 1.0 micron from the first or second outer film surface.

18. The multilayer thermoplastic polymer film according to claim 15, wherein the film is free of protrusions extending outward more than 0.5 microns from the first or second outer film surface.

19. The multilayer thermoplastic polymer film according to claim 15, wherein the adhesion layer comprises 55% to 75% by weight of butene copolymer polyethylene and 15% to 30% by weight of high density polyethylene.