CLAIMS

What is claimed is:

1. A process for preparing a polymer compound, comprising:
    a) obtaining a recommended processing temperature range of a polymer from a technical data sheet;
    b) providing a feed composition comprising the polymer and a filler; wherein the filler is present in the feed composition in an amount ranging from 5% to 40% by weight of the feed composition;
    c) homogenizing the feed composition to form a molten polymer composition; wherein homogenizing is carried out at a temperature that is 10 ℃ to 100 ℃ higher than the upper limit of the recommended processing temperature range of the polymer; thereby forming the polymer compound.

2. The process of claim 1, further comprising solidifying the molten polymer composition; wherein the filler is a carbon black which retains at least 80% of its structure after solidifying the molten polymer composition, as measured by transmission electron microscopy (TEM) according to ASTM D3849.

3. The process of claim 2, wherein the filler retains at least 90% of its structure after solidifying the molten polymer composition, as measured by transmission electron microscopy (TEM) according to ASTM D3849.

4. The process of claim 2, wherein the filler retains at least 95% of its structure after solidifying the molten polymer composition, as measured by transmission electron microscopy (TEM) according to ASTM D3849.

5. The process of claim 2, wherein the molten polymer composition is solidified into pellets of the polymer compound.

6. The process of claim 1, wherein the filler is present in the feed composition in an amount ranging from 15% to 30% by weight of the feed composition.

7. The process of claim 1, wherein the filler is present in the feed composition in an amount ranging from 18% to 27% by weight of the feed composition.

8. The process of claim 1, wherein an aggregate of the filler has an aciniform structure as determined by transmission electron microscopy (TEM).

9. The process of claim 1, wherein the filler is a carbon black.

10. The process of claim 9, wherein the carbon black is semi-conductive or conductive.

11. The process of claim 9, wherein the carbon black has an oil absorption number (OAN) of at least 100cc/100g as measured according to ASTM D2414-18.

12. The process of claim 9, wherein the carbon black has an oil absorption number (OAN) ranging from 100cc/100g to 250cc/100g as measured according to ASTM D2414-18.

13. The process of claim 9, wherein the carbon black has an oil absorption number (OAN) ranging from 100cc/100g to 180cc/100g as measured according to ASTM D2414-18.

14. The process of claim 9, wherein the carbon black has (a) an oil absorption number (OAN) ranging from 100cc/100g to 180cc/100g as measured according to ASTM D2414-18; (b) a nitrogen surface area (NSA) ranging from 50 m^2/g to 210 m^2/g as measured by ASTM D6556; and (c) a statistical thickness surface area (STSA) ranging from 50 m^2/g to 150 m^2/g as measured by ASTM D6556.

15. The process of claim 9, wherein the carbon black has a mean particle size distribution ranging from 20 nm to 60 nm as measured according to ASTM D3849.

16. The process of claim 9, wherein the carbon black has a mean particle size distribution ranging from 40 nm to 50 nm as measured according to ASTM D3849.

17. The process of claim 1, wherein the polymer is a melt-processable polymer, a thermoplastic, or a thermoset.

18. The process of claim 1, wherein the polymer is a poly(olefin), a polyethylene, a polypropylene, an acetal, an acrylic, a polyamide, a polystyrene, a polyvinyl chloride, an acrylonitrile butadiene styrene, a polycarbonate, or a copolymer or mixture thereof.

19. The process of claim 1, wherein the polymer has a melt flow index of at least 5 g/10 min as measured according to ASTM D1238.

20. The process of claim 1, wherein the polymer has a melt flow index of at least 20 g/10 min as measured according to ASTM D1238.

21. The process of claim 1, wherein the polymer has a melt flow index ranging from 10 g/10 min to 90 g/10 min as measured according to ASTM D1238.

22. The process of claim 1, wherein the polymer compound is a conductive polymer compound.

23. The process of claim 22, wherein the surface resistivity of an injected-molded chip formed from the conductive polymer compound is 1,000 ohm/square or less as measured on a Loresta-GP MCP-T600 resistivity meter according to ASTM D4496.

24. The process of claim 22, wherein the surface resistivity of an injected-molded chip formed from the conductive polymer compound ranges from 10 ohm/square to 1,000 ohm/square as measured on a Loresta-GP MCP-T600 resistivity meter according to ASTM D4496.

25. The process of claim 22, wherein the surface resistivity of an injected-molded chip formed from the conductive polymer compound ranges from 10 ohm/square to 80 ohm/square as measured on a Loresta-GP MCP-T600 resistivity meter according to ASTM D4496.

26. The process of claim 22, wherein the surface resistivity of an injected-molded chip formed from the conductive polymer compound ranges from 20 ohm/square to 80 ohm/square as measured on a Loresta-GP MCP-T600 resistivity meter according to ASTM D4496.

27. The process of claim 1, wherein the filler is a carbon black, and wherein the polymer compound has a dispersion index of at least 80 as measured according to ASTM D2663.

28. The process of claim 1, wherein the filler is a carbon black, and wherein the polymer compound has a dispersion index of at least 90 as measured according to ASTM D2663.

29. The process of claim 1, wherein the filler is a carbon black, and wherein the polymer compound has a dispersion index of at least 95 as measured according to ASTM D2663.

30. The process of claim 1, wherein the process comprises:
    a) providing a mixing device having a hopper and a mixing chamber;
    b) supplying the feed composition comprising the polymer and the filler to a hopper of the mixing device;
    c) transferring the feed composition from the hopper into the mixing chamber of the mixing device;
    d) homogenizing the feed composition within the mixing chamber to form the molten polymer composition.

31. The process of claim 30, wherein the mixing chamber of the mixing device comprises at least one co-rotating double-rotor.

32. The process of claim 30, wherein the mixing chamber of the mixing device comprises counter-rotating and non-intermeshing double rotors.

33. The process of claim 32, wherein the counter-rotating and non-intermeshing double rotors are selected from a style 7/7 (#7/#7) rotor combination, a style 7/15 (#7/#15) rotor combination, a style 15/7 (#15/#7) rotor combination, or a style 15/15 (#15/#15) rotor combination.

34. The process of claim 30, wherein the feed composition is supplied to the hopper of the mixing device at a rate of least 500 kg/hr.

35. A conductive polymer compound prepared by the method of any of claims 1-34.