CLAIMS

1. A method for producing a filament comprising:

using one or more extruders to extrude a first set of materials for a core of the filament and a second set of materials for a sheath of the filament, wherein the second set of materials comprises at least one or both of fibers or particles;

using a core section and a sheath section of at least one die head in order to route the first set of materials and the second set of materials, respectively, that are extruded from the one or more extruders; and

during or after using the core section and the sheath section of the at least one die head, forming the filament by cooling the first set of materials and the second set of materials.

2. The method of claim 1, wherein the one or more extruders comprises at least first extruder to melt, mix, and extrude the first set of materials and at least second extruder to melt, mix, and extrude the second set of materials; and

wherein the at least second extruder comprise a twin-screw extruder.

3. The method of claim 2, wherein the second set of materials comprises at least one thermoplastic polymer and the at least one or both of fibers or particles.

4. The method of claim 3, wherein the second set of materials further comprises a water-soluble polymer.

5. The method of claim 3, wherein a diameter of the core section of the at least one die head is at least five times greater than a thickness of the sheath section of the at least one die head.

6. The method of claim 2, wherein the second set of materials comprises at least one thermoplastic polymer; and

wherein the second set of materials are evenly distributed throughout the at least one thermoplastic polymer.

7. The method of claim 2, wherein the second set of materials comprises at least one thermoplastic polymer; and

wherein the second set of materials are randomly distributed throughout the at least one thermoplastic polymer.

8. The method of claim 2, wherein the at least first extruder comprise a single-screw extruder.

9. The method of claim 2, wherein the at least first extruder and the at least second extruder deliver a melt stream to a single die head as part of a co-extrusion process.

10. The method of claim 9, wherein the melt stream is shaped into a coaxial structure with a core layer and a sheath layer.

11. The method of claim 10, wherein extruding results in the at least one or both of fibers or particles pushing through the sheath layer.

12. The method of claim 1, wherein the at least one die head consists of a single die head.

13. The method of claim 1, wherein the second set of materials comprises at least one thermoplastic polymer; and

wherein orientation of the at least one or both of fibers or particles in the filament after cooling is controlled by one or more aspects of the at least one or both of fibers or particles or the at least one thermoplastic polymer.

14. The method of claim 13, wherein the one or more aspects comprises one or both of: particle length or thickness of sheath layer of the filament relative to particle length.

15. The method of claim 13, wherein the one or more aspects comprises viscosity of the at least one thermoplastic polymer.