CLAIMS

1. A method of forming a fiber comprising:

subjecting a preform to a thermal drawing process to draw the preform into a fiber; and

applying, at intervals, a compressive force to sections of the fiber along a length of the fiber during the thermal drawing process to reduce a dimension of the sections to form the fiber into an accordion-like fiber.

2. The method as claimed in claim 1, wherein applying the compressive force comprises:

passing the fiber through an iris; and

closing the iris, at the intervals, to apply the compressive force to the sections of the fiber.

3. The method as claimed in claim 2, wherein a thickness of the iris is between 0.05 mm and 0.5 mm.

4. The method as claimed in any one of claims 1 to 3,

wherein the thermal drawing process comprises heating the preform at a drawing temperature of between 100°C and 500°C;

wherein the thermal drawing process optionally comprises drawing the preform into the fiber at a drawing rate of between 0.1 m/min and 10 m/min.

5. The method as claimed in any one of claims 1 to 4, wherein the compressive force applied to the sections of the fiber is between 0.5 N and 10 N.

6. The method as claimed in any one of claims 1 to 5,

wherein applying the compressive force to the sections of the fiber comprises applying the compressive force to reduce the sections to between 30% and 70% of a diameter of the fiber;

wherein applying the compressive force to the sections of the fiber optionally comprises applying the compressive force at time intervals of between 0.001s and 3s.

7. The method as claimed in any one of claims 1 to 6, wherein applying the compressive force to the sections of the fiber comprises applying, for each of the sections of the fiber, the compressive force for between 0.001s and 3s.

8. The method as claimed in any one of claims 1 to 7,

wherein a spacing between adjacent sections of the sections of the fiber is between 0.05 mm and 10 mm;

wherein a density of the sections of the fiber relative to the fiber is optionally between 10% and 80%.

9. A method of forming a fiber comprising:

subjecting a preform to a thermal drawing process to draw the preform into a fiber; and

inducing a relative rotational movement between the preform and a region of the fiber during the thermal drawing process to twist the fiber until the twisted fiber becomes coiled to form a spring-like fiber.

10. The method as claimed in claim 9,

wherein the thermal drawing process comprises heating the preform at a drawing temperature of between 100°C and 500°C;

wherein the thermal drawing process optionally comprises drawing the preform into the fiber at a drawing rate of between 0.1 m/min and 10 m/min.

11. The method as claimed in claim 9 or 10, wherein inducing the relative rotational movement comprises rotating at least one of the preform or the region of the fiber at a rotation rate of between 50 rpm and 20000 rpm.

12. The method as claimed in any one of claims 9 to 11, wherein inducing the relative rotational movement between the preform and a region of the fiber comprises rotating the preform and the region of the fiber in opposite directions.

13. The method as claimed in any one of claims 9 to 12,

wherein a diameter of the spring-like fiber is between 100 µm and 10 mm;

wherein a period between adjacent coils of the spring-like fiber is optionally between 100 µm and 10 mm; and

wherein a number of coils of the spring-like fiber, for each meter of the spring-like fiber, is optionally between 100 and 10000.

14. A fiber actuator comprising the spring-like fiber formed by the method as claimed in any one of claims 9 to 13.

15. A fiber bundle comprising:

at least one fiber actuator, wherein the fiber actuator comprises the accordion-like fiber formed by the method as claimed in any one of claims 1 to 8 or as claimed in claim 14; and

at least one functional fiber configured to function as at least one of a sensor or an energy harvester.

16. The fiber bundle as claimed in claim 15, wherein the at least one functional fiber comprises a pair of electrodes arranged spaced apart.

17. The fiber bundle as claimed in claim 16, wherein the at least one functional fiber further comprises:

an insulative core, wherein the pair of electrodes are arranged on opposite sides of the insulative core.

18. A method of forming a fiber bundle comprising:

arranging at least one fiber actuator, wherein the fiber actuator comprises the accordion-like fiber formed by the method as claimed in any one of claims 1 to 8 or as claimed in claim 14, and at least one functional fiber configured to function as at least one of a sensor or an energy harvester to form the fiber bundle.

19. The method as claimed in claim 18, wherein arranging the at least one fiber actuator and the at least one functional fiber to form the fiber bundle comprises:

forming the at least one fiber actuator according to the method as claimed in any one of claims 1 to 13;

forming the at least one functional fiber;

defining a hollow spacing in one of the at least one fiber actuator and the at least one functional fiber; and

inserting the other of the at least one fiber actuator and the at least one functional fiber into the hollow spacing.