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 about 0.05 mm and about 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 about 100°C and about 500°C;~~.~~

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

~~5. The method as claimed in any one of claims 1 to 4, wherein the thermal drawing process comprises drawing the preform into the fiber at a drawing rate of between about 0.1 m/min and about 10 m/min.~~

~~6~~5. The method as claimed in any one of claims 1 to ~~5~~4, wherein the compressive force applied to the sections of the fiber is between about 0.5 N and about 10 N.

~~7~~6. The method as claimed in any one of claims 1 to ~~6~~5,

wherein applying the compressive force to the sections of the fiber comprises applying the compressive force to reduce the sections to between about 30% and about 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 about 0.001s and about 3s.

~~8. The method as claimed in any one of claims 1 to 7, wherein applying the compressive force to the sections of the fiber comprises applying the compressive force at time intervals of between about 0.001s and about 3s.~~

~~9~~7. The method as claimed in any one of claims 1 to ~~8~~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 about 0.001s and about 3s.

~~10~~8. The method as claimed in any one of claims 1 to ~~9~~7,

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

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

~~11. The method as claimed in any one of claims 1 to 10, wherein a density of the sections of the fiber relative to the fiber is between about 10% and about 80%.~~

~~12. The method as claimed in any one of claims 1 to 11, wherein the preform comprises a thermoplastic.~~

~~13. The method as claimed in claim 12, wherein the thermoplastic comprises a material that is responsive to at least one of heat, electric field, light, chemical or vapour.~~

~~14~~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.

~~15~~10. The method as claimed in claim ~~14~~9,

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

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

~~16. The method as claimed in claim 14 or 15, wherein the thermal drawing process comprises drawing the preform into the fiber at a drawing rate of between about 0.1 m/min and about 10 m/min.~~

~~17~~11. The method as claimed in ~~any one of claims 14 to 16~~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 about 50 rpm and about 20000 rpm.

~~18~~12. The method as claimed in any one of claims ~~14~~9 to ~~17~~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.

~~19~~13. The method as claimed in any one of claims ~~14~~9 to ~~18~~12,

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

wherein a period between adjacent coils of the spring-like fiber is optionally between about 100 µm and about 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.

~~20. The method as claimed in any one of claims 14 to 19, wherein a period between adjacent coils of the spring-like fiber is between about 100 µm and about 10 mm.~~

~~21. The method as claimed in any one of claims 14 to 20, wherein a number of coils of the spring-like fiber, for each meter of the spring-like fiber, is between 100 and 10000.~~

~~22. The method as claimed in any one of claims 14 to 21, wherein the preform comprises a solid core.~~

~~23. The method as claimed in any one of claims 14 to 22, wherein the preform comprises a thermoplastic.~~

~~24. The method as claimed in claim 23, wherein the thermoplastic comprises a material that is responsive to at least one of heat, electric field, light, chemical or vapour.~~

~~25~~14. A fiber actuator comprising the accordion-like fiber formed by the method as claimed in any one of claims 1 to ~~13~~8.

~~26~~15. A fiber actuator comprising the spring-like fiber formed by the method as claimed in any one of claims ~~14~~9 to ~~24~~13.

~~27~~16. A fiber bundle comprising:

at least one fiber actuator as claimed in claim ~~25~~14 or ~~26~~15; and

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

~~28. The fiber bundle as claimed in claim 27, wherein the at least one functional fiber comprises a shell comprising a thermoplastic polymer.~~

~~29. The fiber bundle as claimed in claim 27 or 28, wherein the at least one functional fiber comprises a core comprising a thermoelectric glass or a conductive material.~~

~~30~~17. The fiber bundle as claimed in claim ~~27 or 28~~16, wherein the at least one functional fiber comprises a pair of electrodes arranged spaced apart.

~~31~~18. The fiber bundle as claimed in claim ~~30~~17, 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.

~~32. The fiber bundle as claimed in claim 31, wherein the insulative core is deformable.~~

~~33~~19. A method of forming a fiber bundle comprising:

arranging at least one fiber actuator as claimed in claim ~~25~~14 or ~~26~~15 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.

~~34~~20. The method as claimed in claim ~~33~~19, 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 ~~24~~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.