Claims

1. A method of manufacturing a spiral sheet product via an additive manufacturing process, the method comprising:

obtaining an electronic file representing a geometry of the spiral sheet product; and

controlling an additive manufacturing apparatus to manufacture, via the additive manufacturing process, the spiral sheet product according to the geometry specified in the electronic file,

wherein the geometry of the spiral sheet product comprises:

a geometric model of a spiral body revolving around a longitudinal axis and a geometric model of at least one supporting structure extending through a centre region of the spiral body for supporting the spiral body, ;

the spiral body comprising spiral sections repeating along the longitudinal axis;

each spiral section comprising unit cells repeating along a spiral length of the spiral section; and

each unit cell comprising a geometric pattern, such that the repetitive geometric pattern functionalizes the spiral sheet product that is arrangeable into a flat sheet product that is larger than a build chamber of the additive manufacturing apparatus.

2. The method according to claim 1, wherein the geometric pattern enables the respective spiral section to form a mesh pattern.

~~3. The method according to claim 1 or 2, wherein the geometry of the spiral sheet product further comprises a geometric model of at least one supporting structure extending through a centre region of the spiral body.~~

43. The method according to claim ~~3~~1 or 2, wherein the at least one supporting structure comprises a perforated tubular structure.

54. The method according to any one of claims 1 to 43, wherein the additive manufacturing process comprises laser powder bed fusion.

65. The method according to any one of claims 1 to 43, wherein the additive manufacturing process comprises photopolymerization.

76. The method according to any one of claims 1 to 65, wherein obtaining the electronic file comprises a computerized method of generating the geometry of the spiral sheet product, the computerized method comprising:

creating a first unit cell comprising the geometric pattern;

defining the longitudinal axis and a spiral path revolving around the longitudinal axis, the spiral path having pitch and revolution parameters;

repeating the first unit cell along the spiral path to generate a first spiral section comprising the unit cells repeating along the spiral length;

defining a height for the spiral body along the longitudinal axis;

repeating the first spiral section along the longitudinal axis and through the height to generate the geometric model of the spiral body comprising the spiral sections repeating along the height; and

generating the geometry of the spiral sheet product in the electronic file.

87. The method according to any one of claims 1 to 76, further comprising performing a set of treatment processes on the spiral sheet product.

98. The method according to claim 87, wherein the treatment processes comprise cooling the spiral sheet product.

109. The method according to claim 8 7 or 98, wherein the treatment processes comprise removing waste material from the spiral sheet product.

1110. The method according to any one of claims 8 7 to 109, wherein the treatment processes comprise vapour smoothing surfaces of the spiral sheet product.

~~12~~11. The method according to any one of claims 1 to ~~11~~10, comprising controlling the additive manufacturing apparatus to manufacture a plurality of the spiral sheet products nested together.

~~13~~12. The method according to claim ~~12~~11, comprising joining the plurality of the spiral sheet products together.

~~14~~13. A spiral sheet product manufactured via an additive manufacturing process, the spiral sheet product comprising:

a spiral body revolving around a longitudinal axis;

at least one supporting structure extending through a centre region of the spiral body for supporting the spiral body~~,~~;

the spiral body comprising spiral sections repeating along the longitudinal axis;

each spiral section comprising unit cells repeating along a spiral length of the spiral section; and

each unit cell comprising a geometric pattern,

wherein the spiral sheet product is functionalized by the repetitive geometric pattern and is arrangeable into a flat sheet product that is larger than a build chamber of the additive manufacturing apparatus.

~~15. The spiral sheet product according to claim 14, further comprising at least one supporting structure extending through a centre region of the spiral body.~~

~~16~~14. The spiral sheet product according to claim ~~15~~13, wherein the at least one supporting structure comprises a perforated tubular structure.

~~17~~15. The spiral sheet product according to ~~any one of claims 14 to 16~~claim 13 or 14, wherein the additive manufacturing process comprises laser powder bed fusion.

~~18~~16. The spiral sheet product according to ~~any one of claims 14 to 16~~claim 13 or 14, wherein the additive manufacturing process comprises photopolymerization.

~~19~~17. The spiral sheet product according to any one of claims ~~14~~ 13 to ~~18~~16, wherein the geometric pattern comprises a mesh pattern.

~~20~~18. The spiral sheet product according to any one of claims ~~14~~ 13 to ~~19~~17, wherein the flat sheet product comprises a meshed sheet product.

~~21~~19. The spiral sheet product according to claim ~~20~~18, wherein the meshed product is manufacturable into one or more feed spacers for spiral wound membrane modules.

~~22~~20. A computer program comprising computer executable instructions that, when executed by a processor, cause the processor to control an additive manufacturing apparatus to manufacture a product comprising the spiral sheet product according to any one of claims ~~14~~ 13 to ~~21~~19.