CLAIMS

[Claim 1]

A structure for additively manufactured electronics where at least two inks are processed, the structure including:

a plurality of substructures (10, 20) comprising a first substructure (10) and a second substructure (20) holding at least one electronic component (15), wherein the second substructure (20) is at least partially additively manufactured on the first substructure (10); and

a vernier-based position marker (30) configured to indicate a relative offset between the first substructure (10) and the second substructure (20), wherein two patterns are introduced into the first substructure (10) and the second substructure (20).

[Claim 2]

The structure of claim 1, wherein the position marker (30) comprises a first vernier pattern (310) and a second vernier pattern (320), wherein the first vernier pattern (310) is formed on the first substructure (10) and the second vernier pattern (320) is formed on the second substructure (20) or on a component of an apparatus for additive manufacturing.

[Claim 3]

The structure of claim 2, wherein the first vernier pattern (310) is formed on a top surface (110) of the first substructure (10) and the second vernier pattern (320) is formed on a bottom surface (210) of the second substructure (20), wherein the bottom surface (210) and the top surface (110) are facing each other.

[Claim 4]

The structure of claim 2 or claim 3, wherein the first vernier pattern (310) and the second vernier pattern (320) each comprise a grid (311, 321) or each comprise at least one vernier scale (312, 322) to indicate an offset in one or both directions (X,Y) perpendicular to the additive manufacturing direction (Z).

[Claim 5]

The structure of claim 4, wherein the at least one vernier scale (312, 322) comprises at least one first side scale (312) on a side surface of the first substructure (10) and at least one second side scale (322) on a side surface of the second substructure (20), wherein side surfaces form a lateral boundary of the structure.

[Claim 6]

The structure of claim 4 or claim 5, wherein the at least one vernier scale (312, 322) comprises:

a first vertical vernier scale formed periodically in the manufacturing direction (Z), and a second vertical vernier scale formed on a part of the apparatus for additive manufacturing for detecting a vertical offset of the first substructure (10) and/or the second substructure (20).

[Claim 7]

The structure according to any one of the preceding claims, wherein the substructures (10, 20) comprise a transparent material at least at a position of the position marker (30) to enable optical detection by means of an optical sensor.

[Claim 8]

The structure according to any one of the preceding claims, wherein the substructures (10, 20) comprise a dielectric material at least at a position of the position marker (30) and the position marker (30) comprises electrically conductive material to enable electrical detection of the offset.

[Claim 9]

The structure of claim 8, wherein the position marker (30) comprises a linear encoder.

[Claim 10]

The structure according to any one of the preceding claims, wherein the position marker (30) is a first position marker and the structure additionally comprises a second vernier-based position marker spaced apart from the first position marker (30) to increase measurement accuracy or detect a twist.

[Claim 11]

A method for an additive manufacturing of a structure using an additive manufacturing apparatus, comprising the steps of:

Providing a first substructure (10) having a first vernier pattern (310);

Equipping the first substructure (10) with an electronic component (15);

Additively manufacturing a second substructure (20), wherein a second vernier pattern (320) is fabricated on the second substructure (20) or formed on the additive manufacturing apparatus, and

wherein the first vernier pattern (310) and a second vernier pattern (320) form a position marker (30) to indicate a relative offset between the first substructure (10) and the second substructure (20).

[Claim 12]

The method of claim 11,

wherein providing a first substructure (10) having a first vernier pattern (310) comprises additively fabricating the first substructure (10) together with the first vernier pattern (310), and

wherein equipping the first substructure (10) comprises:

Removing the additively manufactured first substructure (10) from an additive manufacturing apparatus;

equipping the first substructure (10) with the electronic component (15); and

Reinserting the first substructure (10) together with the electronic component (15) into the additive manufacturing apparatus.

[Claim 13]

The method of claim 11 or claim 12, further comprising:

Determining an offset using the position marker (30),

Correcting the determined offset when a threshold value is exceeded,

wherein additively manufacturing the second substructure (20) is completed only after correction of the offset.

[Claim 14]

An apparatus comprising means for carrying out a method according to claim 11 for additive manufacturing of a structure using an additive manufacturing apparatus, wherein the structure comprises a first vernier pattern (310), the apparatus comprising:

a component having a second vernier pattern (320) configured to form, together with the first vernier pattern (310), a position marker (30) based on the vernier principle to indicate a relative offset between the component and the structure.