CLAIMS

1. A method of manufacturing discretized optical security microstructures (2) on a substrate (4) comprising steps of

a) providing an ink into cavities of a shim (1), wherein said each cavity of the shim represents an element of said discretized optical security microstructures (2),

b) pressing the shim (1) against the substrate (4),

c) removing the shim (1) from the substrate (4)

characterized in that in the step c) the shim (1) is removed from the substrate (4) such that the ink remains on a surface of the substrate (4) forming discretized optical security microstructures (2), wherein said discretized optical security microstructures (2) form an image, wherein each at least one element (2) of said discretized optical security microstructure (2) is placed in a designed space.

2. The method according to claim 1, characterized in that the method comprises two step of

a1) providing an ink onto a surface of a shim (1) which comprises at least one cavity representing an element of the discretized optical security microstructures (2),

a2) removing excessing ink from the shim (1) such that the ink remains in cavities.

3. The method according to claim 1 or 2, characterized in that the thickness *z1* of the ink printed on the surface of the substrate (4) is defined as a function *f* of the location on said surface:

$z1=f(x,y)$,

wherein *(x,y)* are coordinates of a point on said surface and *z1* is measured in the direction normal, perpendicular, to said surface.

4. The method according to claim 1, 2 or 3, characterized in that the method further comprises the step of

d) hardening the discretized optical security microstructures (2).

5. The method according to any one of previous claims, characterized in that at least one element (2) of said discretized optical security microstructures (2) forms a lens, or a diffractive lens like structure, or other optical element.

6. The method according to any one of previous claims, characterized in that the surface of the discretized optical security microstructures (2) is an optically active surface (3), preferably in a form of macro and/or micro relief, or curved shape with or without grating/hologram micro relief.

7. The method according to any one of previous claims, characterized in that the substrate (4) is used, which comprises at least one element (2) of said discretized optical security microstructures (2) or which consists in at least one element (2) of said discretized optical security microstructures (2).

8. The method according to any one of previous claims, characterized in that the substrate (4) comprises plastic or paper or the substrate (4) is plastic or paper

9. The method according to any one of claims from 4 to 8, characterized in that ultraviolet light is used in the hardening step d).

10. The method according to any one of claims 4 to 9, characterized in that heat is used in the hardening step d).

11. The method according to any one of previous claims, characterized in that the at least one element of said discretized optical security microstructures (2) have the width and the length from 80 μm to 50cm and depth from 300 nm to 100 μm.

12. The method according to any one of previous claims, characterized in that elements (2) of said discretized optical security microstructures (2) have at least two different heights or different surfaces.

13. The method according to any one of claims from 4 to 12, characterized in that the substrate (4), preferably after the hardening step d), is laminated as a sandwich structure, wherein the substrate (4) is a first layer, a second layer is made of a polymer or a resin and wherein said discretized optical security microstructures (2) are between the substrate and the second layer.

14. The method according to any one of previous claims, characterized in that each element (2) of said discretized optical security microstructure (2) is separated from other such element of said discretized optical security microstructures (2), wherein the separation distance is from 1 μm to 50cm, preferably from 30 μm to 10cm, most preferably from 80 μm to 1500 μm.

15. The method according to any one of previous claims, characterized in that the shim (1) is placing at least one element (2) of said

discretized optical security microstructures (2) on a relief on a substrate (4).

16. A shim for use in the method according to any one of the claims 1-15, said shim (1) comprising a number of cavities and wherein the characteristic size of individual cavity, such as its width and the length, is from 80 μm to 50cm and the depth of individual cavity is from 300 nm to 100 μm, characterized in that each said cavity of the shim (1) represents an element (2) of discretized optical security microstructures (2) representing diffractive or another optically active surface (3), preferably in a form of macro and/or micro relief, or simply curved shape with or without grating/hologram micro relief, wherein said discretized optical security microstructures (2) form an image, wherein each element (2) of said microstructures (2) is placed in a designed place.

17. The shim according to claim 16, characterized in that each cavity have different size and/or surface.

18. The shim according to claim 16 or 17, characterized in each cavity is separated from other cavities, wherein the separation distance is from 1 μm to 50cm, preferably from 30 μm to 10cm, most preferably from 80 μm to 1500 μm.

19. The shim according to claim 16, 17 or 18, characterized in that it is made of preferably metal such as nickel.

20. The shim according any one of claims 16-19, characterized in that a depth *z2* of the cavity is defined as a function *g* of the location on the surface of the shim:

$$z2=g(x,y),$$

wherein *(x,y)* are coordinates of a point of a cavity surface and *z2* is measured in the direction normal (perpendicular) to said surface.

21. The shim according to any one of claims 16-20, characterized in that said one or more cavities of the shim (1) are a negative of said one or more elements (2) of said discretized optical security microstructures (2) or are a positive of said one or more elements of said discretized optical security microstructures (2).