

This object is achieved according to the invention by a component for manufacturing micro- and/or nanostructured devices, including a base body and a surface which has micro- or nanostructures which form a substantially flat support surface and between which trenches extend with a statistical distribution,
5 to which a vacuum can be applied.

Summary

In an aspect, the present disclosure refers to a component for manufacturing micro- and/or nanostructured devices, comprising a base body (33) and a surface (34) which has micro- or nanostructures (48) which form a substantially flat
10 support surface (52) and between which trenches (54) extend with a statistical distribution, to which a vacuum can be applied.

In an aspect, the present disclosure refers to a method of manufacturing a component (32) according to the above aspect, comprising the step of:

- producing, by means of a laser (60), preferably by laser ablation and/or
15 laser-induced etching, a surface (34) which has micro- or nanostructures (48) which form a substantially flat support surface (52) and between which trenches (54) extend with a statistical distribution, to which a vacuum can be applied.

The basic idea of the invention is to form a flat support surface, in particular by a close-meshed arrangement of defined micro- or nanostructures. This means
20 that, in comparison to sandblasting, a controlled and reproducible surface is produced.

Substrates can be sucked against the flat support surface, thereby avoiding compression or bending. The vacuum required for this is provided by the trenches.

25 Owing to their statistical distribution, any interfering scattering effects and/or incoherent superposition effects when light passes through the component are avoided, allowing a particularly homogeneous substrate exposure.

In particular, the statistical distribution may be a random arrangement of the trenches and/or a random width and/or depth of the trenches.

In other words, the trenches may have random variations in width and/or depth.

- 5 For example, one trench between two microstructures may have a width of 5 μm and/or a depth of 10 μm , whereas another trench between two other microstructures may be 10 μm in width and/or 20 μm in depth.

- 10 It is also conceivable that a maximum trench width depends on the thickness of the substrate to be held. For example, it may be provided that a maximum trench width is less than one tenth of the substrate thickness in order to ensure that no significant deflection and/or bending of the substrate into the trenches will occur.

- 15 Preferably, the maximum trench width is 20 μm at most. As has been found, trench widths below this value are well suited for applying a vacuum to most commonly used substrates without bending.

It is, however, also conceivable that the pins are arranged with a random offset with respect to the grid positions and/or that the grid includes cells, with a pin being arranged at a random position in each cell.

Preferably, the flat support surface is formed by the pin upper surfaces. The
5 height of the pins should therefore vary as little as possible.

For example, it may be provided that the flatness of the support surface is $< 2.5 \mu\text{m}$, preferably $< 0.5 \mu\text{m}$. This means that the support surface formed by the pins does not deviate from an ideal plane by more than $2.5 \mu\text{m}$ or $0.5 \mu\text{m}$, respectively, at any point.

10 The flatness may be predefined by the nature or quality of an initial body from which the component is made. In particular, the trenches may be introduced into this initial body by material removal. Here, no material is removed between the trenches, so that the flatness of the initial body is preserved.

According to one example, the component is configured as a substrate holder
15 for holding a substrate, in particular a stamp or stamp carrier, a mask or a wafer. A vacuum for holding the substrate can be applied to the trenches. This example allows the aforesaid substrates to be held securely and without bending, for example in order to apply further materials to the respective substrate, to expose it and/or to structure it.

20 In a preferred variant, the component, in particular the base body and/or the microstructured surface with its micro- or nanostructures, is at least partially transparent, in particular to UV light. This has the advantage that a substrate that is held can be exposed directly through the component. In this way, exposure channels within the component and/or a lateral light injection, which is complex to
25 implement, can be avoided.

The component may also be formed as a diffuser, with the micro- or nanostructures scattering the light, in particular UV light. This allows a particularly homogeneous and/or diffuse illumination of the substrate to be achieved, in particular also with collimated light.

30 In this connection, it is also conceivable that the illumination angles at which the light exits the base body may be adapted to the particular application.

Furthermore, the component may have an edge area that forms a part of the flat support surface and encloses the micro- or nanostructures. For example, the edge area may be formed to be very smooth and without trenches. When a substrate has been placed on top, the edge area may serve to close off the trenches toward the outside and in this way stabilize the vacuum below the substrate.

In a preferred example, the edge area includes at least one vacuum channel. Provision may also be made for a plurality of vacuum channels, which are in particular evenly distributed in the edge area and open into the trenches toward the inside. This arrangement allows the vacuum to be applied to the trenches in a technically simple manner. There is no need for any central vacuum channels within the base body, which might interfere with the light injection.

In order to simplify an alignment of the component, in particular with a substrate suctioned, with respect to further components, it may be provided that a ratio of the widths of the trenches and of the micro- or nanostructures is greater than $7/3$, preferably greater than $10/1$, and/or an area ratio of the trenches and of the micro- or nanostructures is greater than $100/1$.

Alternatively, it may also be provided that the ratio of the widths of the trenches and of the micro- or nanostructures is smaller than $3/7$, preferably smaller than $1/10$, and/or an area ratio of the trenches and of the micro- or nanostructures is smaller than $1/100$.

In other words, either the trenches or the micro- or nanostructures may dominate the surface of the base body. The respectively non-dominant species only slightly influences the light passing through the base body, so that an alignment of the component with respect to the further devices can be observed through the base body with a comparatively sharp image.

The component according to an example may be employed, for example, in the manufacture of stamps. In this case, a liquid or viscous stamp material is usually filled into a stamp replication device, applied onto a stamp carrier, brought to the desired shape by means of a shaped part, and subsequently cured. Curing can be effected, for example, by heating or by exposing to light through the

component, in particular using UV light. In general, exposure can achieve faster curing than heating.

5 In this process, the stamp carrier or the fully cured stamp is held at the support surface of the component according to the invention by a vacuum, at least temporarily.

The component may further be employed in subsequent imprinting processes, in which the stamp is utilized to replicate the structures of the shaped part. Here, too, the stamp is fixed in place on the component by means of a vacuum and exposed through the component. It is important here that the stamp rests flat
10 against the component so as not to deform.

In an example, a method of manufacturing a component is provided, comprising the step of:

producing, by means of a laser, preferably by laser ablation and/or laser-induced etching, a surface which has micro- or nanostructures which form a
15 substantially flat support surface and between which trenches extend with a statistical distribution, to which a vacuum can be applied.

Laser structuring of the surface allows a targeted incorporation of the trenches into an initial body from which the component is manufactured, without a material removal being carried out between the trenches.

20 In this way, an already existing flatness of the initial body can be preserved when the support surface is formed.

In addition, the laser structuring can be used to easily and cost-effectively realize micro- or nanostructures of specific shapes, sizes and distributions that are specifically suited to the desired application.

25 Further advantages and features of the invention will be apparent from the description below and from the accompanying drawings, to which reference is made and in which:

- Figure 1 schematically shows a stamp replication device;
- Figure 2 shows a top view of the stamp replication device of Figure 1;