head, thus losing the previously attained wedge error compensation. As a result, the accuracy of the structuring is impaired.

It is thus the object of the invention to provide an improved replication device with which the production accuracy in producing nanostructured and/or microstructured components can be improved. Moreover, it is an object of the invention to determine an optimized method for reproducing a structure on a substrate.

Summary

According to a first aspect, the present disclosure refers to a replication device for producing nanostructured and/or microstructured components with two assemblies that can be moved in relation to each other, wherein the first assembly comprises a chuck for receiving a substrate and a second assembly a holder for an imprint structure, in particular a stamp. The assemblies are moveable between an imprint position and a loading position relative to each other, wherein at least a sealing lip is located on one of the two assemblies, said sealing lip facing the other one of the two assemblies and contacting the other one of the two assemblies in the imprint position and radially surrounding the chuck and/or the holder, wherein a sealed overpressure chamber between the two assemblies is limited by the sealing lip in the imprint position.

The first and the second assemblies can be moved along a central axis toward and away from each other. For example, both assemblies are mounted moveably. However, one of the two assemblies, in particular the first assembly, is preferably mounted moveably and the other one of the two assemblies, in particular the second assembly, is mounted stationarily. Thus, it is only necessary to provide a drive for one of the two assemblies, thus simplifying the design of the replication device.

A defined pressure can be applied in the overpressure chamber as a result of the seal, in particular overpressure. This pressure is used to separate the substrate from the imprint structure. This can be achieved by forcing the substrate and the imprint structure actively apart from each other through the application of overpressure. Thus, a previously attained parallelization, in particular a wedge error compensation, can be maintained so that a subsequent production process can take place with a particularly high degree of accuracy.

For example, a set wedge error compensation can be maintained over a longer production period, in particular for the production of at least two nanostructured and/or microstructured components. This is referred to as a “global wedge error compensation”. In this regard, it is important that the wedge error compensation remains precise so that all components can be produced with the same quality.

Alternatively, a wedge error compensation can be reset for each substrate.

The sealing lip surrounds the chuck and/or the holder completely radially in order to reliably seal the overpressure chamber.

The sealing lip is preferably inflatable. The volume of the sealing lip can therefore be varied, in particular increased. Thus, a sealing the overpressure chamber can be carried out particularly reliably. If the volume of the sealing lip is increased while the assemblies are in the imprint position, the assemblies are forced apart by the sealing lip. In addition to the overpressure, the sealing lip can thus actively help to generate a separation force that forces the two assemblies apart.

The height of the sealing lip can vary in the inflated state in the circumferential direction of the sealing lip. This means that that the profile of the sealing lip is not constant. Thus, a detachment of the sealing lip can be simplified when moving the assemblies out of the imprint structure. In this case, the sealing lip is namely not separated along its complete circumference uniformly, but rather it is detached gradually, first at the points with the least height and then at the points with the greatest height. Preferably, the height of the sealing lip in the circumferential direction initially increases continuously starting from the lowest point until a highest point and then decreases again. Thus, there are no steps in the sealing lip.

The sealing lip is for example annular or portal-shaped seen in top view of the corresponding assembly. Such geometries are easily producible. In addition, the geometry of the sealing lip can be adapted to the geometry of the first assembly, in particular the chuck.

According to an example, two sealing lips may be provided that are inflatable separately from each other, wherein one of the sealing lips surrounds

the other radially, in particular completely. In this way, two sealed chambers that are separated from each other can be formed, thus optimizing the imprint process. The sealing lips can vary in their contours and/or in their heights. Alternatively or additionally, one of the sealing lips can have a varying height and the other sealing lip can have a constant height.

The inner sealing lip of both sealing lips is preferably formed in such a way that a substrate positioned on a chuck is positioned completely within the first chamber.

According to an example, a first chamber can be formed by means of the inner sealing lip and a second chamber by means of the outer sealing lip, wherein the first chamber is a vacuum chamber and the second chamber the overpressure chamber. By means of a vacuum chamber, the substrate is drawn to the stamp, thus achieving a particularly good alignment of the substrate on the imprint structure. In addition, the vacuum can be used to degas the imprint material in an imprint process as well as to remove small bubbles from the imprint material and between the imprint structure, the imprint material and the substrate.

The overpressure chamber is used to separate the substrate from the imprint structure as previously described.

For example, the use of the first sealing lip results in an annular, particularly rotationally symmetrical pressure chamber seen in top view and the use of the second sealing lip an axially symmetrical, in particular portal-shaped pressure chamber seen in top view.

The imprint structure is for example formed by a silicon-based polymer, in particular polydimethylsiloxane. Other polymer materials are however also conceivable. In particular, the imprint structure can be sticky and/or rippled.

The polymer can be located on a glass plate and thus form a stamp. Alternatively, the polymer can be applied to a sheet material which is located on the glass plate. The sheet material can be firmly pressed on the glass plate by the overpressure in the overpressure chamber. The imprint structure has sufficient stability as a result of the glass plate and does not bend when the substrate is moved against the imprint structure. The polymer itself is however elastic. This is advantageous as when applying overpressure, the polymer

material can be compressed to a certain extent by the overpressure, whereby a detachment of the imprint structure from the substrate also occurs, in particular an active detachment.

The first assembly can form, for the purpose of wedge error compensation, a wedge error compensation head comprising a stationary part and a moving part. The moving part, which contains in particular the chuck for receiving the substrate, can be fixed in place at a specific angle relative to the stationary part when the wedge error compensation is set.

In addition, the replication device comprises for example a pressure source for generating overpressure in the sealing lip and/or the overpressure chamber. Thus, sufficiently high overpressure can be generated in the sealing lip as required in order to form the overpressure chamber and/or sufficiently high pressure may be generated in the overpressure chamber in order to achieve active movement of the first assembly and the second assembly relative to each other and to ensure uniform detachment of the substrate from the imprint structure without losing the wedge error compensation.

Moreover, an exposure device can be provided for curing microstructures and/or nanostructures formed on a substrate. Such an exposure device is for example suitable for exposing microstructuring and/or nanostructuring to ultraviolet light, in particular to light of a wavelength of 250nm to 459nm, preferably 365nm.

Furthermore, according to a second aspect, the present disclosure refers to a method for reproducing a structure on a substrate, in particular using a replication device designed as previously described in the first aspect comprising the following steps:

- placing a substrate on a first assembly of the replication device, in particular on a chuck, and placing an imprint structure on a second assembly of the replication device, in particular a holder;

- moving the assemblies relative to each other from a loading position into an imprint position, in particular after the substrate and the imprint structure have been placed in the replication device, wherein a surface of the substrate facing the imprint surface or a coating of the substrate