Method for treating millimetre and/or micrometre and/or nanometre structures on a surface of a substrate

Description

Countless methods for treating the surface of substrates, in particular wafers, exist in the prior art. A very important aspect of the processing of substrates is constituted by processing on both sides. With processing on both sides, both sides of the substrate are treated, in particular in succession. Here, it is necessary to suitably protect the fixing side, i.e. the side that is not processed. The protection is necessary so as not to destroy the substrate side as a result of the fixing. In the prior art there exist many materials which are used for the protection of a substrate side during the fixing on a sample holder. These materials are preferably polymers, which, after application to the substrate upper side, are brought into a first state by chemical and/or physical process, which state optimally protects the structures of the fixed substrate side.

The problem with the materials lies in the removal thereof. Most materials are cured, in particular cross-linked, by chemical processes. This results in a certain tendency to adhere to the structures of the substrate surface. Furthermore, removal of the materials from the interstices of the structures becomes more difficult the longer is the polymer chain, the greater is the adhesive strength, and the greater the viscosity of the polymer.

Embodiments of the present invention disclose a method with which the structures on the surface of the substrate can be optimally protected, but at a later moment in time a removal that is as simple as possible can be performed.

According to a first aspect of the present invention, there is provided a method for treating a substrate having millimetre and/or micrometre and/or nanometre structures, wherein at least one protective material is applied to the structures, wherein the at least one protective material can be dissolved in a solvent, characterized in that the structures are produced by an imprinting process.

According to a second aspect of the present invention, there is provided a facility for treating a substrate having millimetre, micrometre and/or nanometre structures, in particular for carrying out the above method, said facility comprising a fixing device for fixing the substrate, an application means, in particular a nozzle device having one or more nozzles and/or immersion bath, for applying at least one protective material to the structures, wherein the at least one protective material can be dissolved in a solvent, characterized in that the structures are produced by an imprinting process.

According to a third aspect of the present invention, there is provided a product, in particular produced using the above method and/or the above facility, comprising a substrate with millimetre and/or micrometre and/or nanometre structures and at least one coating on the structures formed from at least one protective material, wherein the at least one protective material can be dissolved by a solvent, characterized in that the structures are produced by an imprinting process.

According to a fourth aspect of the present invention, there is provided a method for processing a substrate, in particular a film, the method including at least the steps of: delivering the substrate by a delivery unit, applying and/or arranging, in particular on both sides of the substrate, millimetre and/or micrometre and/or nanometre structures on the substrate, applying, in particular on both sides of the substrate, at least one protective material to the structures, in particular using the above method, wherein the at least one protective material can be dissolved in a solvent, receiving the substrate by a storage unit, characterized in that the structures are produced by an imprinting process.

According to a fifth aspect of the present invention, there is provided a facility for processing a substrate, in particular a film, including: a delivery unit for delivering the substrate, a processing unit for applying and/or arranging millimetre and/or micrometre and/or nanometre structures on the substrate, an application means for applying at least one protective material to the structures, in particular using the above method, wherein the at least one protective material can be dissolved in a solvent, a storage unit for receiving the substrate, characterized in that the structures are produced by an imprinting process.

All combinations of at least two features specified in the description, the claims and/or the drawings also fall within the scope of the invention. Where value ranges are specified, values lying within the specified limits are also disclosed as limit values and can be claimed in any combination.

In accordance with embodiments of the invention, a method for treating a substrate having millimetre and/or micrometre and/or nanometre structures is proposed, wherein at least one protective material is applied to the structures, wherein the at least one protective material can be dissolved in a solvent.

The process according to embodiments of the invention allows the protection of a structured surface, in particular provided by 3D structures. The structured surface has been produced in particular by an imprint process. However, production by hot stamping processes, photolithographic processes, etching processes, etc. are also conceivable.

One or more structures worthy of protection is/are disposed on the substrate surface of the substrate. For the sake of simplicity, reference will usually be made hereinafter to structures in the plural. These structures can be microchips, MEMs, cavities, LEDs, stores, but in particular embossed structures. The structures are coated by a protective material according to embodiments of the invention.

The concept according to embodiments of the invention consists of the use of a protective material-solvent combination. The protective material-solvent combination must be designed such that a solution of the protective material in the solvent is produced in an optimal manner in accordance with the principle “like mixes with like”. Here, the solvent is used as a cleaning agent in order to remove the protective material from a substrate surface after a predefined number of process steps.

The protective material protects the structures from all types of loads which occur on the substrate surface and/or the opposing, second