c) removing said mold from said polymeric substrate.

In one aspect, there is provided a method of forming a plurality of imprints on an inner surface of a polymeric substrate comprising the steps of:

a) contacting a liquid polymeric mixture with a mold having an imprint forming surface thereon;

b) curing the liquid polymeric mixture of step a) to form said polymeric substrate having said plurality imprints on said inner surface, when cured; and

c) removing said mold from said polymeric substrate,

wherein said mold having said imprint forming surface thereon comprises a dissolvable material or temperature-dependent material.

There is provided a method of forming a mold having an imprint forming surface thereon, wherein said method is a nanoimprinting method, a micromachining method or a self-assembly method.

In another aspect, there is provided a method of forming a mold having an imprint forming surface thereon, wherein said method is a nanoimprinting method, a micromachining method or a self-assembly method, wherein said mold having said imprint forming surface thereon comprises a dissolvable material or temperature-dependent material.

Advantageously, the method disclosed herein may produce the plurality of imprints in the form of micro- or nano-structures having high-aspect ratio.

More advantageously, the method as defined herein may form isotropic and anisotropic micro- or nano-structures.

Still advantageously, the micro- or nano-structured tubings produced by the method defined herein may be relatively long (~10 cm).

Further advantageously, the micro- or nano-structured tubings produced by the method defined above may typically be re-used whereby the tubings can be both elastic and non-elastic (stiff).

In another aspect, there is provided a mold prepared by the method as defined above.

Definitions

The following words and terms used herein shall have the meaning indicated:

The term ‘organosilicon’ is to be interpreted broadly to refer to any organometallic compounds containing carbon-silicon bonds, which may include monomeric, oligomeric or polymeric form thereof.

The term “polyurethane” as used herein refers to macromolecules in the form of polymers, co-polymers or segmented polymers or segmented co-polymers which contain at least one

Claims

1. A method of forming a plurality of imprints on an inner surface of a polymeric substrate comprising the steps of:
a) contacting a liquid polymeric mixture with a mold having an imprint forming surface thereon;
b) curing the liquid polymeric mixture of step a) to form said polymeric substrate having said plurality imprints on said inner surface, when cured; and
c) removing said mold from said polymeric substrate,
wherein said mold having said imprint forming surface thereon comprises a dissolvable material or temperature-dependent material.

2. The method of claim 1, wherein the step of contacting said liquid polymeric mixture with said mold having said imprint forming surface thereon occurs in the presence or in the absence of an external mold.

3. The method of claim 1, wherein said dissolvable material is acrylic-based polymer, acrylate-based polymer, polystyrene or mixtures thereof.

4. The method of claim 1, wherein said temperature-dependent material is a mixture of two or more hydrocarbons having twenty to forty carbon atoms.

5. The method of claim 1, wherein the step of removing said mold from said polymeric substrate is undertaken in the presence of one or more solvents.

6. The method of claim 1, wherein the step of removing said mold from said polymeric substrate is undertaken in the absence of solvent.

7. The method of claim 1, the step of removing said mold from said polymeric substrate comprises the step of distorting the shape or size of said mold by subjecting said mold to a vacuum.

8. The method of claim 1, wherein said plurality of imprints on the inner surface of said polymeric substrate is a one-dimensional, two-dimensional or three-dimensional structure.

9. The method of claim 8, wherein said plurality of imprints on the inner surface of said polymeric substrate is continuous or discrete.

10. The method of claim 1, wherein said plurality of imprints on the inner surface of said polymeric substrate has a lateral dimension in the range of 20 nm to 40 nm.

11. The method of claim 1, wherein said plurality of imprints on the inner surface of said polymeric substrate has a vertical dimension in the range of 1nm to 5nm.

12. The method of claim 2, wherein said external mold comprises the same or different material as said mold.

13. The method of claim 1, wherein said liquid polymeric mixture comprises polymeric organosilicon compounds selected from the group consisting of polymethylhydrosiloxane (PMHS), polydimethylsiloxane (PDMS), polyethylmethylsiloxane (PEMS), polydiethylsiloxane (PDES) and blends thereof.

14. The method of claim 1, wherein the step of curing said liquid polymeric mixture is by heating or by UV irradiation.

15. A method of forming a mold having an imprint forming surface thereon, wherein said method is a nano-imprinting method, a micro-machining method or a self-assembly method, wherein said mold having said imprint forming surface thereon comprises a dissolvable material or temperature-dependent material.

16. The method of claim 15, wherein said nanoimprinting method comprises the steps of:
i) imprinting a surface of a polymeric film; and
ii) adhering the imprinted polymeric film onto an outer surface of a pre-mold,
wherein the non-imprinted surface of the polymeric film is in contact with the pre-mold to thereby form said mold having an imprint forming surface thereon.

17. A mold prepared by the method of claim 15.