Claims

1. A resin mold comprising:

a substrate,

a resin layer formed upon the substrate and having a depressions and protrusions pattern formed on the surface of the resin layer,

and a release layer containing a mold release agent and being formed with uniform thickness on at least the surface of the depressions and protrusions pattern of said resin layer;

wherein said resin layer comprises a solvent soluble resin and an additive; said additive is a compound, or hydrolysate thereof, of General Formula (1):

$Y_{3-n}(CH_3)_nSiX$ (1)

wherein Y is a methoxy or ethoxy group; X is an organic group including one type selected from the group consisting of an epoxy group, glycidoxy group, and optionally substituted phenyl group or amino group; and n is 0 or 1;

the solvent soluble resin has a constituent unit having a substituent group of the same type as X in said General Formula (1); and

~~the additive contains a substituent group capable of coupling with said mold release agent and a substituent group having compatibility with said solvent soluble resin and has bleeding ability with respect to the solvent soluble resin;~~

said additive is localized in the vicinity of said resin layer surface, the substituent group Y in said General Formula (1) of the additive, or a hydrolysate of such substituent group Y, ~~and the substituent group capable of coupling with the mold release agent contained in the additive~~ bonds~~s~~ing chemically with said mold release agent to couple together said resin layer and release layer.

2. The resin mold according to claim 1; wherein the pure water contact angle of said release layer surface is greater than or equal to 100 degrees.

~~3. The resin mold according to claim 1 or 2, wherein said additive is a compound, or hydrolysate thereof, indicated by the below listed General Formula (1):~~

~~$Y_{3-n}(CH_3)_nSiX$ (1)~~

~~wherein General Formula (1), Y is a methoxy or ethoxy group, X is an organic group including one type selected from the group consisting of an epoxy group, glycidoxy group, and optionally substituted phenyl group or amino group, and n is 0 or 1.~~

~~4~~3. The resin mold according to ~~any one of~~ claim~~s~~ 1 ~~or~~to ~~2~~3; wherein the content of said additive within said resin layer is from 1 to 13 percent by weight.

~~5. The resin mold according to claim 3 or 4, wherein said solvent soluble resin has a constituent unit having a substituent group of the same type as X in said General Formula (1).~~

~~6~~4. The resin mold according to claim ~~5~~1; wherein, in said solvent soluble resin, the content of the constituent unit having the substituent group of the same type as X in said General Formula (1) is from 1 to 15 percent by weight.

~~7. The resin mold according to any one of claims 3 to 6,~~

~~wherein said substituent group of said additive having compatibility with said solvent soluble resin is the substituent group X in said General Formula (1).~~

~~8. The resin mold according to any one of claims 3 to 7; wherein said substituent group of said additive capable of coupling with said mold release agent is the substituent group Y in said General Formula (1) or a hydrolysate of such substituent group Y.~~

~~9~~5. The resin mold according to any one of claims 1 to ~~8~~4; wherein said mold release agent is at least one type selected from the group consisting of fluorine-based silane coupling agents, mono-terminal aminated perfluoro (perfluoroether) compounds, and mono-terminal carboxylated perfluoro (perfluoroether) compounds.

~~10~~6. The resin mold according to any one of claims 1 to ~~9~~5; wherein said substrate is a resin substrate, glass substrate, silicon substrate, sapphire substrate, carbon substrate, or GaN substrate.

~~11~~7. The resin mold according to claim ~~6 10~~; wherein said resin substrate is one type of resin selected from the group

consisting of: polyethylene terephthalate, polycarbonates, polymethylmethacrylates, polyimides, polysulfones, polyether sulfones, cyclic polyolefins, and polyethylene naphthalates.

~~12. The resin mold according to any one of claims 1 to 11, wherein period of the depressions and protrusions pattern of the surface is from 10 nm to 50 μm.~~

~~13. The resin mold according to any one of claims 1 to 12, wherein shape of the depressions and protrusions pattern of the surface is linear shaped, columnar shaped, moth eye pattern shaped, or lens shaped.~~

~~14~~8. A method of production of a resin mold comprising steps of:

(I) applying to a substrate a solution dissolving a solvent soluble resin and an additive in a solvent, and forming a resin solution layer on the substrate;

(II) removing the solvent from said resin solution layer and forming a resin layer upon the substrate;

(III) contacting a mold against said resin layer, and transferring a depressions and protrusions pattern formed in the surface of said mold to the surface of said resin layer; and

(IV) coating a mold release agent on the surface of at least the depressions and protrusions pattern of said resin layer, and

forming a release layer of uniform thickness;

wherein the additive is a compound, or hydrolysate thereof, of General Formula (1):

$Y_{3-n}(CH_3)_nSiX$ (1)

wherein Y is a methoxy or ethoxy group; X is an organic group including one type selected from the group consisting of an epoxy group, glycidoxy group, and optionally substituted phenyl group or amino group; and n is 0 or 1,

and the solvent soluble resin has a constituent unit having a substituent group of the same type as X in said General Formula (1).

~~15~~9. A method of use of a resin mold comprising steps of:

contacting the resin surface against the resin mold according to any one of claims 1 to 7~~13~~;

and ~~pealing~~peeling said resin mold from said resin.

~~16~~10. The method of use of a resin mold according to claim ~~15~~9;

wherein said resin is a photo-curable resin.

~~17~~11. The resin mold according to any one of claims 1 to 7~~13~~;

wherein the resin mold is fixed to a roller.