

WHAT IS CLAIMED IS:

1. A method of treating a substrate, comprising:
 - a) supplying a sublimating material to a substrate having a pattern disposed on a surface thereof, wherein the sublimating material comprises a sublimating compound and a surface modification agent;
 - b) maintaining the sublimating material on the surface for a time sufficient to modify the surface;
 - c) solidifying the sublimating material on the surface; and
 - d) removing by sublimation the sublimating material disposed on the surface.
2. The method of claim 1, wherein the sublimating compound has a melting point of from about -20°C to about 60°C and a vapor pressure of at least about 1 mm Hg at 25°C.
3. The method of claim 1, wherein the sublimating compound has a melting point of from about 0°C to about 20°C.
4. The method of claim 1, wherein the sublimating compound has a surface tension of at most about 65 mN/m at 25°C.
5. The method of claim 1, wherein the sublimating compound has a viscosity of at most about 5 centistokes at 25°C.
6. The method of claim 1, wherein the sublimating compound is selected from the group consisting of t-butanol, glacial acetic acid, octamethylcyclotetrasiloxane, pentafluorophenol, 2-acetyl-5-methyl furan, p-chlorotoluene, acrylic acid, pyrimidine, 4-methyl thiazole, p-xylene, ethylene dibromide, paraldehyde, ethylenediamine, 1,4-dioxane, formic acid, hexafluorobenzene, benzene, cyclohexane, 4-pyridinol, camphene, 2,2-dimethyl-1-propanol, cyanamide, dimethyl carbonate, trimethylsilanol, dimethyl sulfoxide, cyclohexanol, and trimethylacetoneitrile.

7. The method of claim 1, wherein the sublimating compound is in an amount of from about 40% by weight to about 99.5% by weight of the sublimating material.

5 8. The method of claim 1, wherein the surface modification agent comprises a Si-containing compound.

9. The method of claim 8, wherein the Si-containing compound is a disilazane.
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10. The method of claim 9, wherein the disilazane is hexamethyldisilazane, heptamethyldisilazane, N-methyl hexamethyldisilazane, 1,3-diphenyltetramethyldisilazane, or 1,1,3,3-tetraphenyl-1,3-dimethyldisilazane.

11. The method of claim 8, wherein the Si-containing compound comprises a trimethylsilyl group.
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12. The method of claim 11, wherein the Si-containing compound is trimethylsilyltriflate, N-(trimethylsilyl)dimethylamine, N-(trimethylsilyl)diethylamine, 4-trimethylsilyloxy-3-penten-2-one, bis(trimethylsilyl)sulfate, methoxytrimethylsilane, ethoxytrimethylsilane, N-allyl-N,N-bis(trimethylsilyl)amine, N-(trimethylsilyl)diethylamine, N,N-bis-trimethylsilyl urea, trimethylsilanol, N-(trimethylsilyl)acetamide, or tris(trimethylsilyl)phosphate.
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13. The method of claim 8, wherein the Si-containing compound is an aminosilane.
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14. The method of claim 13, wherein the aminosilane is triisopropyl(dimethylamino)silane.
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15. The method of claim 8, wherein the Si-containing compound is a siloxane.

16. The method of claim 15, wherein the siloxane is octamethylcyclotetrasiloxane or 1,3-bis(heptadecafluoro-1,1,2,2-tetrahydrodecyl)tetramethyldisiloxane.

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17. The method of claim 1, wherein the surface modification agent is in an amount of from about 0.5% by weight to about 10% by weight of the sublimating material.

18. The method of claim 1, wherein the sublimating material further comprises a catalyst.

19. The method of claim 18, wherein the catalyst is triflic acid, triflic anhydride, methanesulfonic acid, acetic acid, or acetic anhydride.

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20. The method of claim 18, wherein the catalyst is in an amount of from about 0.1% by weight to about 10% by weight of the sublimating material.

21. The method of claim 1, wherein the sublimating material further comprises a solvent.

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22. The method of claim 21, further comprising a solvent evaporation step.

23. The method of claim 21, wherein the solvent is hexyl acetate, n-butyl acetate, t-butyl acetate, propylene glycol methyl ether acetate (PGMEA), or anisole.

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24. The method of claim 1, wherein the surface comprises SiO₂, SiN, TiN, SiOC, SiON, Si, SiGe, Ge, or W.

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25. A method of treating a substrate, comprising:

a) supplying a sublimating material to a substrate having a pattern disposed on a surface thereof, wherein the sublimating material comprises a sublimating compound and the sublimating compound is a surface modification agent;

5 b) maintaining the sublimating material on the surface for a time sufficient to modify the surface;

c) solidifying the sublimating material on the surface; and

d) removing by sublimation the sublimating material disposed on the surface.

10 26. The method of claim 25, wherein the sublimating compound has a melting point of from about -20°C to about 60°C and a vapor pressure of at least about 1 mm Hg at 25°C.

15 27. The method of claim 25, wherein the sublimating compound has a melting point of from about 0°C to about 20°C.

28. The method of claim 25, wherein the sublimating compound has a surface tension of at most about 65 mN/m at 25°C.

20 29. The method of claim 25, wherein the sublimating compound has a viscosity of at most about 5 centistokes at 25°C.

30. The method of claim 25, wherein the sublimating compound is octamethylcyclotetrasiloxane, trimethylsilanol, t-hexyldimethylchlorosilane, 1,3-bis(heptadecafluoro-1,1,2,2-tetrahydrodecyl)tetramethyldisiloxane,
25 triisopropyldimethylaminosilane, N-(trimethylsilyl)acetamide, or tris(trimethylsilyl)phosphate.

31. The method of claim 25, wherein the sublimating material further
30 comprises a catalyst.

32. The method of claim 31, wherein the catalyst is triflic acid, triflic anhydride, methanesulfonic acid, acetic acid, or acetic anhydride.

33. The method of claim 31, wherein the catalyst is in an amount of from
5 about 0.1% by weight to about 10% by weight of the sublimating material.

34. The method of claim 25, wherein the sublimating material further comprises a solvent.

10 35. The method of claim 34, further comprising a solvent evaporation step.

36. The method of claim 34, wherein the solvent is hexyl acetate, n-butyl acetate, t-butyl acetate, propylene glycol methyl ether acetate (PGMEA), or anisole.

15 37. The method of claim 25, wherein the surface comprises SiO₂, SiN, TiN, SiOC, SiON, Si, SiGe, Ge, or W.

38. A sublimating material, comprising:
a sublimating compound in an amount of from about 40% by weight to about
20 99.5% by weight of the sublimating material; and
a surface modification agent in an amount of from about 0.5% by weight to about 10% by weight of the sublimating material.

39. A sublimating material, comprising:
25 a sublimating compound in an amount of from about 40% by weight to about 99.5% by weight of the sublimating material;
a catalyst in an amount of from about 0.1% by weight to about 10% by weight of the sublimating material; and
a solvent in an amount of from about 0.1% by weight to about 50% by weight of
30 the sublimating material.

40. A sublimating material, comprising:

- a sublimating compound in an amount of from about 40% by weight to about 99.5% by weight of the sublimating material, wherein the sublimating compound is octamethylcyclotetrasiloxane, trimethylsilanol, t-hexyldimethylchlorosilane, 1,3-
5 bis(heptadecafluoro-1,1,2,2-tetrahydrodecyl)tetramethyldisiloxane, triisopropyldimethylaminosilane, N-(trimethylsilyl)acetamide, or tris(trimethylsilyl)phosphate; and
a solvent in an amount of from about 0.1% by weight to about 50% by weight of the sublimating material.

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