

FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
AND
THE PATENTS RULES, 2003

**COMPLETE
SPECIFICATION**

(See Section 10; rule 13)

TITLE OF THE INVENTION

“CURABLE POLYSILOXANE COMPOSITIONS AND PRESSURE SENSITIVE
ADHESIVES MADE THEREFROM”

APPLICANT

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The following specification particularly describes
the invention and the manner in which
it is to be performed

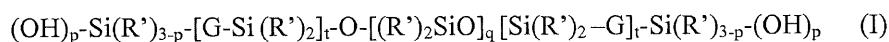
What is claimed is:

1. A curable composition comprising:

at least one polydiorganosiloxane, comprising at least two hydroxysilyl moieties;
 at least one hydroxyl-functional polyorganosiloxane resin; and
 at least one photoactivatable composition that, upon exposure to radiation, generates at
 least one base selected from amidines, guanidines, phosphazenes,
 proazaphosphatranes, and combinations thereof.

2. The composition of claim 1, wherein the polydiorganosiloxane comprises
 polydimethylsiloxane.

3. The composition of claim 1, wherein the at least one polydiorganosiloxane, comprising at least
 two hydroxysilyl moieties comprises the following general formula:



wherein each p is independently an integer of 1, 2, or 3; each G is independently a divalent linking
 group; each R' is independently selected from alkyl, alkenyl, aryl, cycloalkyl, heteroalkyl,
 heteroaryl, heterocycloalkyl, and combinations thereof; q is an integer of 0 to 150,000; and each t
 is independently an integer of 0 or 1.

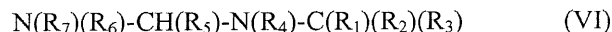
4. The composition of claim 3, wherein each G is independently selected from oxy, alkylene,
 arylene, heteroalkylene, heteroarylene, cycloalkylene, heterocycloalkylene, and combinations
 thereof; each R' is independently selected from alkyl, aryl, and combinations thereof; q is an
 integer of 20 to 150,000; and t is an integer of 0 or 1.

5. The composition of claim 1, wherein the at least one hydroxyl-functional polyorganosiloxane
 resin comprises an MQ resin.

6. The composition of claim 5, wherein the MQ resin comprises M units selected from
 $(\text{CH}_3)_3\text{SiO}_{1/2}$, $(\text{CH}_3)_2(\text{Vi})\text{SiO}_{1/2}$, $(\text{CH}_3)_2\text{ArSiO}_{1/2}$, $(\text{CH}_3)\text{Ar}_2\text{SiO}_{1/2}$, and combinations thereof, where
 Vi is a vinyl group, and Ar is an aryl group.

7. The composition of claim 1, wherein the photoactivatable composition comprises at least one
 1,3-diamine compound that is substituted on at least one nitrogen atom by at least one aralkyl

radical, wherein the at least one 1,3-diamine compound is selected from those that are represented by the formula:



wherein R₁ is selected from aromatic radicals, heteroaromatic radicals, and combinations thereof that absorb light in the wavelength range from 200 nm to 650 nm and that are unsubstituted or substituted one or more times by at least one monovalent group selected from C₁-C₁₈ alkyl, C₂-C₁₈ alkenyl, C₂-C₁₈ alkynyl, C₁-C₁₈ haloalkyl, -NO₂, -NR₁₀R₁₁, -CN, -OR₁₂, -SR₁₂, -C(O)R₁₃, -C(O)OR₁₄, halogen, groups of the formula N(R₇)(R₆)-CH(R₅)-N(R₄)-C(R₂)(R₃)- where R₂-R₇ are as defined for Formula VI, and combinations thereof, and that upon said absorption bring about a photoelimination that generates an amidine or guanidine; R₂ and R₃ are each independently selected from hydrogen, C₁-C₁₈ alkyl, phenyl, substituted phenyl (that is, substituted one or more times by at least one monovalent group selected from C₁-C₁₈ alkyl, -CN, -OR₁₂, -SR₁₂, halogen, C₁-C₁₈ haloalkyl, and combinations thereof), and combinations thereof; R₅ is selected from C₁-C₁₈ alkyl, -NR₈R₉, and combinations thereof; R₄, R₆, R₇, R₈, R₉, R₁₀ and R₁₁ are each independently selected from hydrogen, C₁-C₁₈ alkyl, and combinations thereof; or R₄ and R₆ together form a C₂-C₁₂ alkylene bridge that is unsubstituted or is substituted by one or more monovalent groups selected from C₁-C₄ alkyl radicals and combinations thereof; or R₅ and R₇, independently of R₄ and R₆, together form a C₂-C₁₂ alkylene bridge that is unsubstituted or is substituted by one or more monovalent groups selected from C₁-C₄ alkyl radicals and combinations thereof; or, if R₅ is -NR₈R₉, then R₇ and R₉ together form a C₂-C₁₂ alkylene bridge that is unsubstituted or is substituted by one or more monovalent groups selected from C₁-C₄ alkyl radicals and combinations thereof; R₁₂ and R₁₃ are each independently selected from hydrogen, C₁-C₁₉ alkyl, and combinations thereof; and R₁₄ is selected from C₁-C₁₉ alkyl and combinations thereof.

8. The composition of claim 1, wherein the photoactivatable composition comprises at least one compound that is an organoborate salt of a protonated amidine, guanidine, phosphazene, or proazaphosphatane.

9. The composition of claim 1, wherein the photoactivatable composition comprises at least one compound selected from 8-benzyl-1,8-diazabicyclo[5.4.0]undecane, 8-benzyl-6-methyl-1,8-diazabicyclo[5.4.0]undecane, the tetraaryl borate salt of protonated 1,8-diazabicyclo[5.4.0]undecene, and combinations thereof.

10. The composition of claim 1, wherein the photoactivatable composition further comprises at least one photosensitizer.

11. The composition of claim 1, wherein the composition is solventless.

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12. A pressure sensitive adhesive comprising:

a cured curable composition, the curable composition comprising:

at least one polydiorganosiloxane, comprising at least two hydroxysilyl moieties;

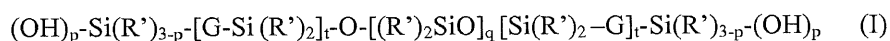
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at least one hydroxyl-functional polyorganosiloxane resin; and

at least one photoactivatable composition that, upon exposure to radiation, generates at least one base selected from amidines, guanidines, phosphazenes, proazaphosphatranes, and combinations thereof.

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13. The pressure sensitive adhesive of claim 12, wherein the at least one polydiorganosiloxane, comprising at least two hydroxysilyl moieties comprises the following general formula:



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wherein each p is independently an integer of 1, 2, or 3; each G is independently a divalent linking group; each R' is independently selected from alkyl, alkenyl, fluoroalkyl, aryl, fluoroaryl, cycloalkyl, fluorocycloalkyl, heteroalkyl, heterofluoroalkyl, heteroaryl, heterofluoroaryl, heterocycloalkyl, heterofluorocycloalkyl, and combinations thereof; q is an integer of 0 to 150,000; and each t is independently an integer of 0 or 1.

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14. The pressure sensitive adhesive of claim 12, wherein the at least one hydroxyl-functional polyorganosiloxane resin comprises an MQ resin.

15. A method of preparing a coating comprising:

providing a curable composition, the curable composition comprising:

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at least one polydiorganosiloxane, comprising at least two hydroxysilyl moieties;

at least one hydroxyl-functional polyorganosiloxane resin; and

at least one photoactivatable composition that, upon exposure to radiation, generates at least one base selected from amidines, guanidines, phosphazenes, proazaphosphatranes, and combinations thereof;

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providing a substrate comprising at least a first major surface and a second major surface;
 applying the curable composition to at least a portion of at least one major surface of the substrate; and
 5 inducing the curable composition to cure to form a coating by exposing at least a portion of the curable composition to radiation.

16. The method of claim 15, wherein the radiation comprises ultraviolet radiation, visible radiation, or a combination thereof.

17. The method of claim 15, further comprising drying the curable composition and/or the cured composition.

18. An article comprising:

a substrate comprising at least a first major surface and a second major surface; and
 a pressure sensitive adhesive coated on at least a portion of at least one major surface of the substrate, the pressure sensitive adhesive comprising:

a cured curable composition, the curable composition comprising:

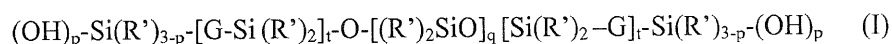
at least one polydiorganosiloxane, comprising at least two hydroxysilyl moieties;

at least one hydroxyl-functional polyorganosiloxane resin; and

at least one photoactivatable composition that, upon exposure to radiation, generates at least one base selected from amidines, guanidines, phosphazenes, proazaphosphatranes, and combinations thereof.

19. The article of claim 18, wherein the substrate comprises a film, a release liner, a tape backing, a metal foil, a plates, or the outer surface of an article.

20. The article of claim 18, wherein the at least one polydiorganosiloxane, comprising at least two hydroxysilyl moieties comprises the following general formula:



wherein each p is independently an integer of 1, 2, or 3; each G is independently a divalent linking group; each R' is independently selected from alkyl, alkenyl, fluoroalkyl, aryl, fluoroaryl,

cycloalkyl, fluorocycloalkyl, heteroalkyl, heterofluoroalkyl, heteroaryl, heterofluoroaryl, heterocycloalkyl, heterofluorocycloalkyl, and combinations thereof; q is an integer of 0 to 150,000; and each t is independently an integer of 0 or 1.

21. The article of claim 18, wherein the at least one hydroxyl-functional polyorganosiloxane resin comprises an MQ resin.

22. The article of claim 18, wherein the photoactivatable composition comprises at least one compound that is an organoborate salt of a protonated amidine, guanidine, phosphazene, or proazaphosphatane.

23. The article of claim 18, wherein the photoactivatable composition comprises at least one compound selected from 5-benzyl-1,5-diazabicyclo[4.3.0]nonane, 5-(anthracen-9-yl-methyl)-1,5-diaza[4.3.0]nonane, 5-(2'-nitrobenzyl)-1,5-diazabicyclo[4.3.0]nonane, 5-(4'-cyanobenzyl)-1,5-diazabicyclo[4.3.0]nonane, 5-(3'-cyanobenzyl)-1,5-diazabicyclo[4.3.0]nonane, 5-(anthraquinon-2-yl-methyl)-1,5-diaza[4.3.0]nonane, 5-(2'-chlorobenzyl)-1,5-diazabicyclo[4.3.0]nonane, 5-(4'-methylbenzyl)-1,5-diazabicyclo[4.3.0]nonane, 5-(2',4',6'-trimethylbenzyl)-1,5-diazabicyclo[4.3.0]nonane, 5-(4'-ethenylbenzyl)-1,5-diazabicyclo[4.3.0]nonane, 5-(3'-trimethylbenzyl)-1,5-diazabicyclo[4.3.0]nonane, 5-(2',3'-dichlorobenzyl)-1,5-diazabicyclo[4.3.0]nonane, 5-(naphth-2-yl-methyl)-1,5-diazabicyclo[4.3.0]nonane, 1,4-bis(1,5-diazabicyclo[4.3.0]nonanylmethyl)benzene, 8-benzyl-1,8-diazabicyclo[5.4.0]undecane, 8-benzyl-6-methyl-1,8-diazabicyclo[5.4.0]undecane, 9-benzyl-1,9-diazabicyclo[6.4.0]dodecane, 10-benzyl-8-methyl-1,10-diazabicyclo[7.4.0]tridecane, 11-benzyl-1,11-diazabicyclo[8.4.0]tetradecane, 8-(2'-chlorobenzyl)-1,8-diazabicyclo[5.4.0]undecane, 8-(2',6'-dichlorobenzyl)-1,8-diazabicyclo[5.4.0]undecane, 4-(diazabicyclo[4.3.0]nonanylmethyl)-1,1'-biphenyl, 4,4'-bis(diazabicyclo[4.3.0]nonanylmethyl)-1,1'-biphenyl, 5-benzyl-2-methyl-1,5-diazabicyclo[4.3.0]nonane, 5-benzyl-7-methyl-1,5,7-triazabicyclo[4.4.0]decane, the tetraaryl borate salt of protonated 1,8-diazabicyclo[5.4.0]undecene, and combinations thereof.

dated this 27 day of June 2014.

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