What is claimed is:

1. A resin composition, comprising:

a free radical curable resin matrix including an acrylate and a siloxane, the free radical curable resin matrix being selected from the group consisting of 1,3-bis(3-methacryloxypropyl) tetramethyldisiloxane, tetramethyl tetrakis[3-acryloxypropyl]cyclotetrasiloxane, acryloxypropyl methylsiloxane homopolymer, and combinations thereof; ~~and~~

a free radical photoinitiator, the free radical photoinitiator being phenylbis(2,4,6-trimethylbenzoyl)phosphine oxide;

~~wherein, when cured, the resin composition has low or no autofluorescence when exposed to blue excitation wavelengths ranging from about 380 nm to about 480 nm or green excitation wavelengths ranging from about 510 nm to about 560 nm.~~

~~2. The resin composition as defined in claim 1, wherein the cured resin composition has low autofluorescence, and wherein the low autofluorescence corresponds with a grey value of less than 25,000 when the cured resin composition is exposed to the blue excitation wavelengths.~~

~~3. The resin composition as defined in claim 1, wherein the cured resin composition has low autofluorescence, and wherein the low autofluorescence corresponds with a grey value of less than 5,000 when the cured resin composition is exposed to the blue excitation wavelengths.~~

~~4. The resin composition as defined in claim 1, wherein the cured resin composition has low autofluorescence, and wherein the low autofluorescence corresponds with a grey value of less than 10,000 when the cured resin composition is exposed to the green excitation wavelengths.~~

~~5. The resin composition as defined in claim 1, wherein the cured resin composition has low autofluorescence, and wherein the low autofluorescence corresponds with a~~

~~grey value of less than 2,500 when the cured resin composition is exposed to the green excitation wavelengths.~~

~~6. The resin composition as defined in claim 1, wherein the free radical curable resin matrix comprises an acrylate selected from the group consisting of 1,3-bis(3-methacryloxypropyl) tetramethyldisiloxane, methacryloxypropyl-terminated polydimethylsiloxane, tetramethyl tetrakis[3-acryloxypropyl]cyclotetrasiloxane, methacryl polyhedral oligomeric silsesquioxane, acrylo polyhedral oligomeric silsesquioxane, acryloxypropyl methylsiloxane homopolymer, and combinations thereof.~~

~~7. The resin composition as defined in claim 1, wherein the free radical photoinitiator is 2-ethyl-9,10-dimethoxyanthracene.~~

~~8. The resin composition as defined in claim 1, wherein the free radical photoinitiator is selected from the group consisting of 2,2-dimethoxy-2-phenylacetophenone and 2-ethoxy-2-phenylacetophenone.~~

~~9. The resin composition as defined in claim 1, wherein the free radical photoinitiator is a phosphine oxide and wherein the phosphine oxide is selected from the group consisting of diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide, a blend of diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide and 2-hydroxy-2-methylpropiophenone, phenylbis(2,4,6-,trimethylbenzoyl)phosphine oxide, ethyl(2,4,6-trimethylbenzoyl)phenylphosphinate, and combinations thereof.~~

~~10. The resin composition as defined in claim 1, further comprising a dark quencher or an electron acceptor.~~

~~11. The resin composition as defined in claim 1 wherein a weight% ratio of the free radical curable resin matrix to the free radical photoinitiator ranges from about 99.8:0.2 to about 90:10.~~

~~12. The resin composition as defined in claim 1, further comprising:~~

an epoxy resin matrix; and

a photoacid generator.

~~13~~2. A flow cell, comprising:

a substrate; and

a cured, patterned resin on the substrate, the cured, patterned resin including depressions separated by interstitial regions, and the cured, patterned resin having been formed from ~~a~~ the resin composition of claim 1 ~~including:~~

~~a free radical curable resin matrix including an acrylate and a siloxane; and~~

~~a free radical photoinitiator;~~

~~wherein the cured, patterned resin has low or no autofluorescence when exposed to blue excitation wavelengths ranging from about 380 nm to about 480 nm or green excitation wavelengths ranging from about 510 nm to about 560 nm~~.

~~14~~3. The flow cell as defined in claim ~~13~~2, further comprising:

a polymer coating in the depressions; and

a primer grafted to the polymer coating.

~~15. The flow cell as defined in claim 13, wherein the cured, patterned resin has low autofluorescence, and wherein the low autofluorescence corresponds with a grey value of less than 25,000 when the cured, patterned resin is exposed to the blue excitation wavelengths.~~

~~16. The flow cell as defined in claim 13, wherein the cured, patterned resin has low autofluorescence, and wherein the low autofluorescence corresponds with a grey value of less than 10,000 when the cured, patterned resin is exposed to the green excitation wavelengths.~~

17. The flow cell as defined in claim 14, wherein the resin composition further includes:

an epoxy resin matrix; and

a photoacid generator.

18. The flow cell as defined in claim 13, wherein the free radical curable resin matrix comprises an acrylate selected from the group consisting of 1,3-bis(3-methacryloxypropyl) tetramethyldisiloxane, methacryloxypropyl-terminated polydimethylsiloxane, tetramethyl tetrakis[3-acryloxypropyl]cyclotetrasiloxane, methacryl polyhedral oligomeric silsesquioxane, acrylo polyhedral oligomeric silsesquioxane, acryloxypropyl methylsiloxane homopolymer, and combinations thereof.

19. The flow cell as defined in claim 13, wherein the free radical photoinitiator is selected from the group consisting of 2-ethyl-9,10-dimethoxyanthracene, 2,2-dimethoxy-2-phenylacetophenone, and 2-ethoxy-2-phenylacetophenone.

20. The flow cell as defined in claim 13, wherein the free radical photoinitiator is a phosphine oxide selected from the group consisting of diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide, a blend of diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide and 2-hydroxy-2-methylpropiophenone, phenylbis(2,4,6-,trimethylbenzoyl)phosphine oxide, ethyl(2,4,6-trimethylbenzoyl)phenylphosphinate, and combinations thereof.

21. The flow cell as defined in claim 13, wherein the resin composition further comprising a dark quencher or an electron acceptor.

22. The flow cell as defined in claim 13, wherein a weight% ratio of the free radical curable resin matrix to the free radical photoinitiator in the resin composition ranges from about 99.8:0.2 to about 90:10.

~~23~~4. A method of making a flow cell, comprising:

depositing ~~a~~ the resin composition of claim 1 on a substrate~~, the resin composition including:~~

~~a free radical curable resin matrix including an acrylate and a siloxane; and~~

~~a free radical photoinitiator~~;

nanoimprinting the deposited resin composition using a working stamp; and

curing the deposited resin composition to form a cured, patterned resin~~;~~

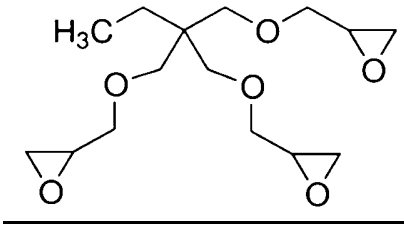
~~wherein the cured, patterned resin has low or no autofluorescence when exposed to blue excitation wavelengths ranging from about 380 nm to about 480 nm or green excitation wavelengths ranging from about 510 nm to about 560 nm~~.

5. The resin composition as defined in claim 1, wherein a weight% ratio of the epoxy resin matrix to the photoacid generator in the resin composition ranges from about 99.8:0.2 to about 90:10.

6. The resin composition as defined in claim 1, wherein the epoxy resin matrix is selected from the group consisting of:

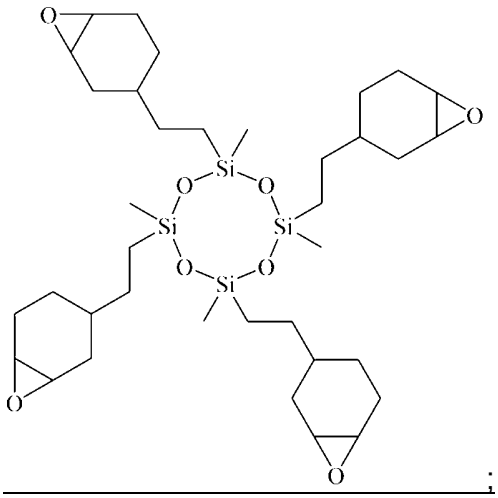
i) an epoxy functionalized polyhedral oligomeric silsesquioxane (POSS);

ii) trimethylolpropane triglycidyl ether:



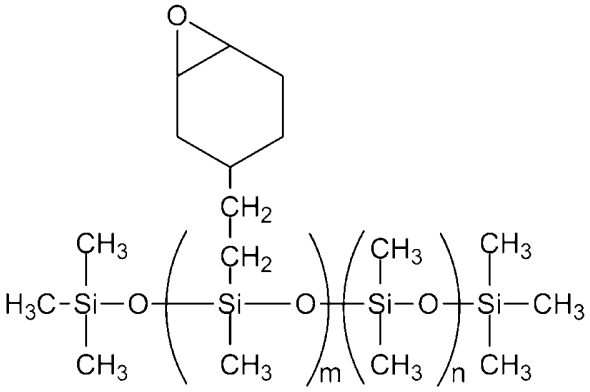
;

iii) tetrakis(epoxycyclohexyl ethyl)tetramethyl cyclotetrasiloxane:



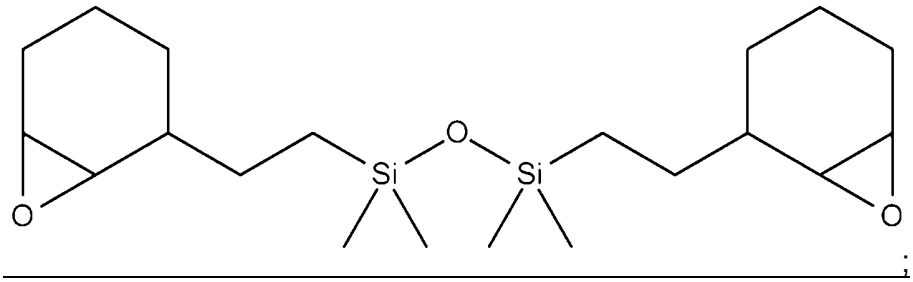
;

iv) a copolymer of (epoxycyclohexylethyl)methylsiloxane and dimethylsiloxane:



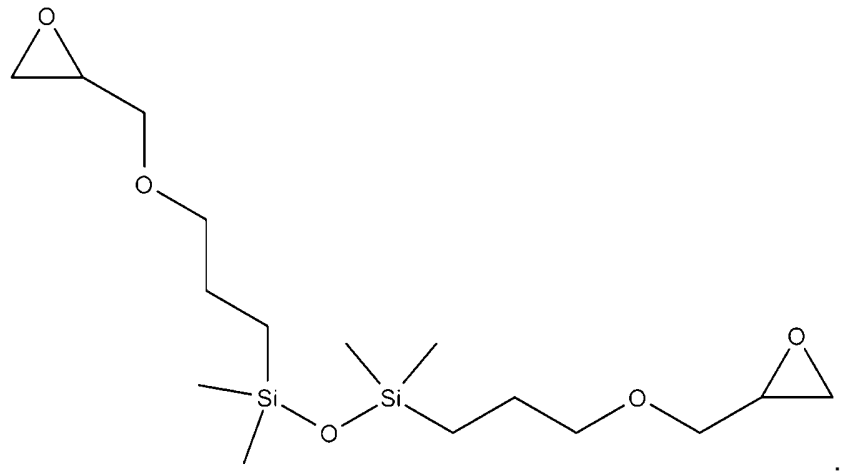
(wherein a ratio of m:n ranges from 8:92 to 10:90);

v) 1,3-bis[2-(3,4-epoxycyclohexyl) ethyl] tetramethyl disiloxane:



;

vi) 1,3-bis(glycidoxypropyl)tetramethyl disiloxane:

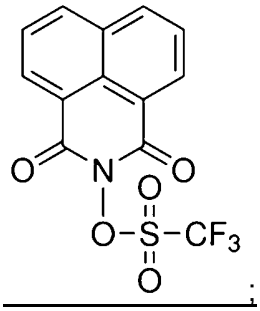


; and

vii) combinations thereof.

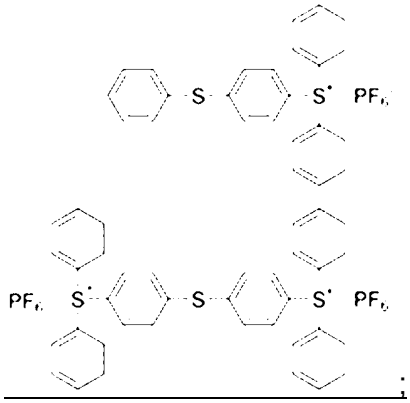
7. The resin composition as defined in claim 1, wherein the photoacid generator is selected from the group consisting of:

i) N-hydroxynaphthalimide triflate:



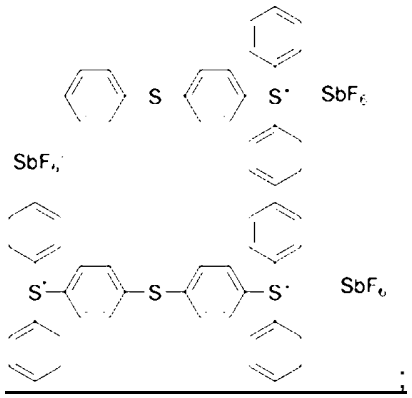
;

ii) triarylsulfonium hexafluorophosphate salts, mixed:

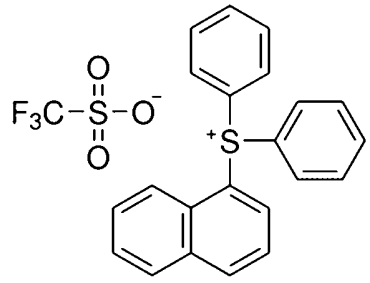


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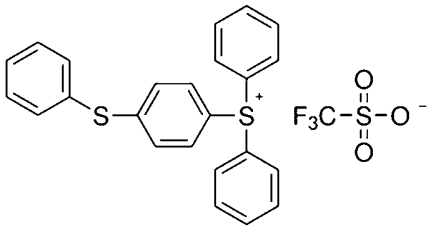
iii) triarylsulfonium hexafluoroantimonate salts, mixed:



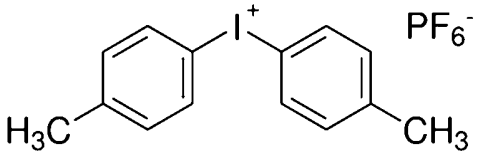
iv) 1-naphthyl diphenylsulfonium triflate (NDS-TF):



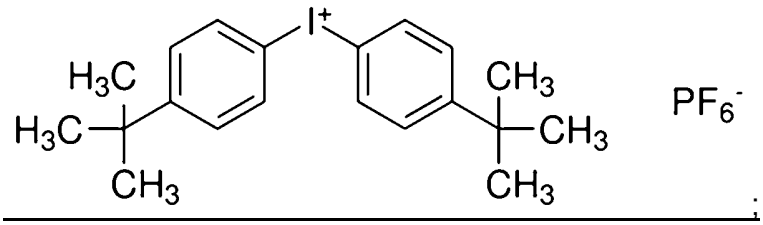
v) (4-phenylthiophenyl)diphenylsulfonium triflate:



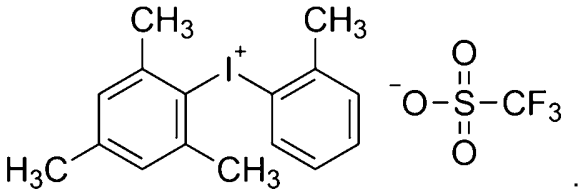
vi) bis-(4-methylphenyl)iodonium hexafluorophosphate:



vii) bis(4-tert-butylphenyl)iodonium hexafluorophosphate:

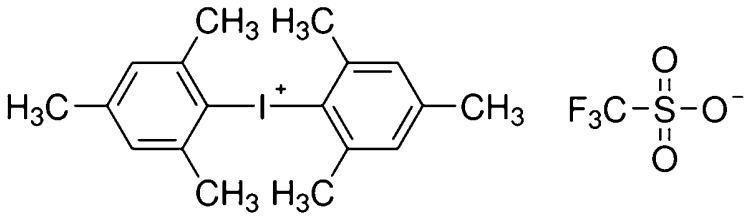


viii) (2-methylphenyl)(2,4,6-trimethylphenyl)iodonium triflate:



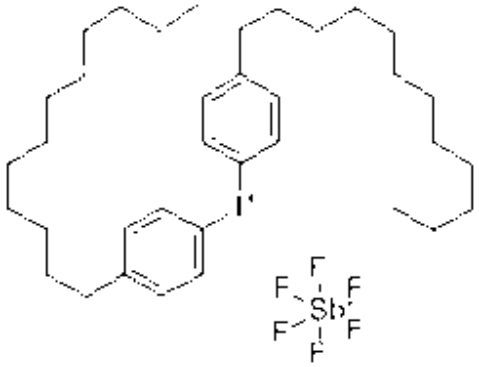
;

xi) bis(2,4,6-trimethylphenyl)iodonium triflate:



;

x) bis-(4-dedecylphenyl)iodonium hexafluoroantimonate salt:



; and

xi) combinations thereof.

8. The resin composition as defined in claim 1, further comprising a surfactant selected from the group consisting of a polyethylene sorbitol ester, a polyoxyethylene sorbitol ester, or octylphenol ethoxylate.

9. The resin composition as defined in claim 1, further comprising a solvent selected from the group consisting of propylene glycol monomethyl ether acetate, toluene, dimethyl sulfoxide, and tetrahydrofuran.