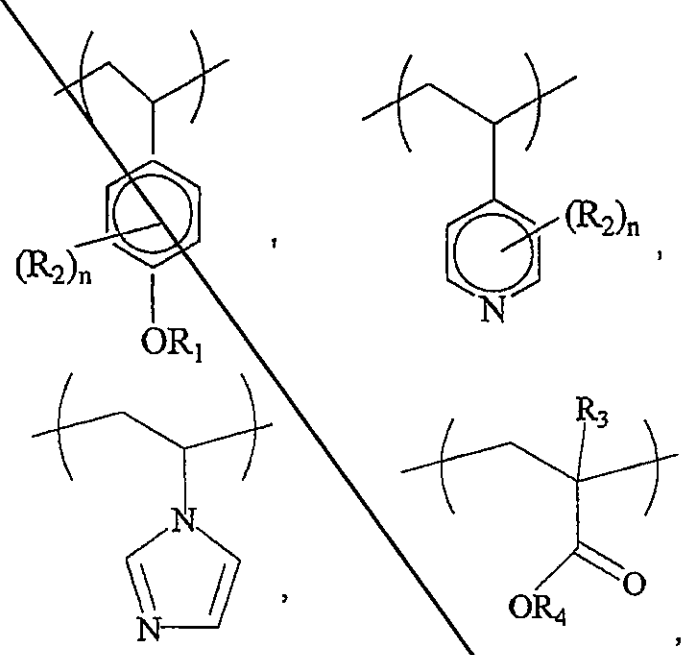
Claims:

1. The combination of:

a substrate having a surface; and

a non-covalently crosslinked layer adjacent said surface, said layer formed from a composition comprising a polymer dissolved or dispersed in a solvent system, said polymer being a copolymer comprised of at least two different recurring monomers, said monomers being selected from the group consisting of:



and combinations of the foregoing,

wherein:

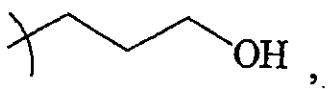
n is 0 to 4;

R_1 is a protecting group;

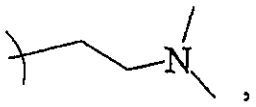
each R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols;

R_3 is selected from the group consisting of H, C_1-C_5 alkyls, -CN, -Br, and -Cl; and

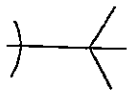
R_4 is selected from the group consisting of C_1-C_6 alkyls,

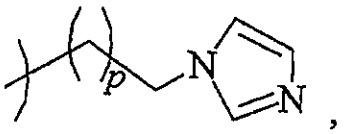


,



,

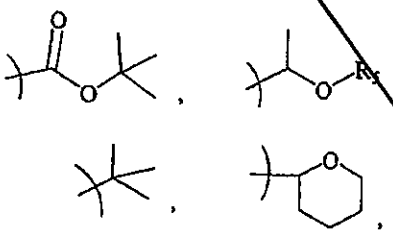

, and



,

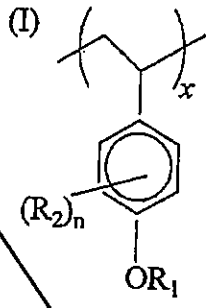
where p is 0-2.

2. The combination of claim 1, wherein R_1 is selected from the group consisting of

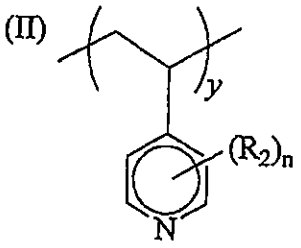


where R_5 is selected from the group consisting of C_1-C_6 alkyls.

3. The combination of claim 1, wherein said recurring monomers are selected from the group consisting of:



and



wherein:

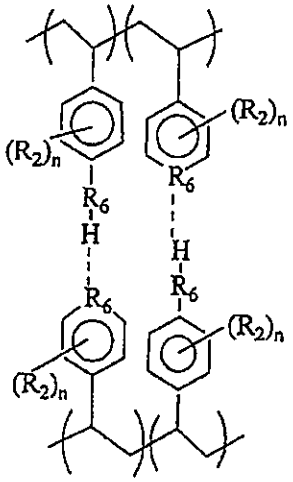
R_1 is a protecting group;

n is 0-4; and

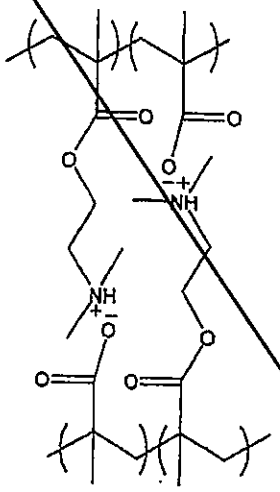
each R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols.

4. The combination of claim 3, wherein the molar ratio of x:y is from 1:3 to 3:1.

5. The combination of claim 1, wherein said non-covalently crosslinked layer comprises crosslinked polymers having a formula selected from the group consisting of



and



wherein:

n is 0-4;

each R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols; and

each R_6 is individually selected from the group consisting of -O- and -N-.

6. The combination of claim 9, said substrate having a surface comprising a plurality of topography features, said topography features forming a dense region and an isolated region on said substrate.

7. The combination of claim 1, wherein at least one of said monomers is a hydrogen donor and the other of said monomers is a hydrogen acceptor.

8. The combination of claim 7, wherein the molar ratio of hydrogen donor to hydrogen acceptor in said polymer is from 1:3 to 3:1.

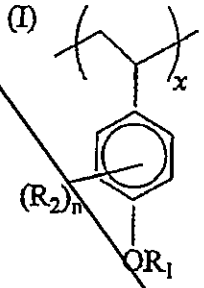
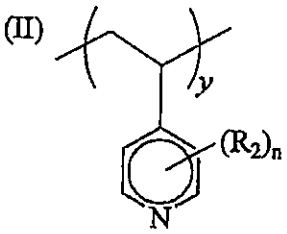
9. The combination of claim 1, wherein said substrate is a microelectronic substrate.

10. The combination of claim 9, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, tantalum nitrite, silicon germanium, silicon dioxide, silicon nitride, aluminum oxide, glass, quartz, and low k dielectrics.

11. The combination of claim 1, wherein said composition is a spin-on carbon composition.

12. The combination of claim 1, wherein said composition is a hardmask.

13. An anti-reflective or fill composition comprising a polymer dispersed or dissolved in a solvent system, said polymer comprising recurring monomers of

(I)  and (II) 

wherein:

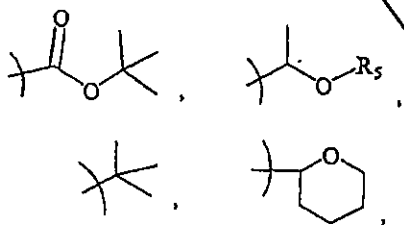
n is 0-4;

the molar ratio of x:y is from 1:3 to 3:1;

R_1 is a protecting group; and

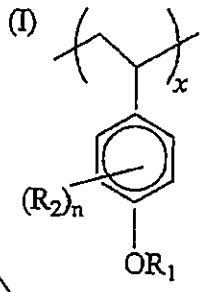
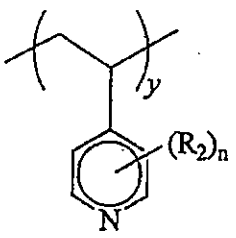
each R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols.

14. The composition of claim 13, wherein R_1 is selected from the group consisting of



where R_5 is selected from the group consisting of C_1-C_6 alkyls.

15. A polymer comprising recurring monomers of

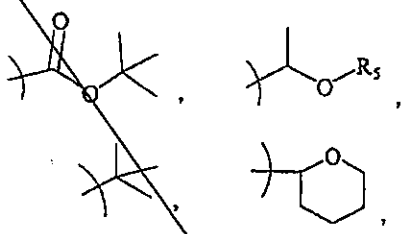
(I)  and (II) 

wherein:

n is 0-4;

the molar ratio of x:y is from1:3 to 3:1;

R_1 is selected from the group consisting of



where R_5 is selected from the group consisting of C_1-C_6 alkyls; and

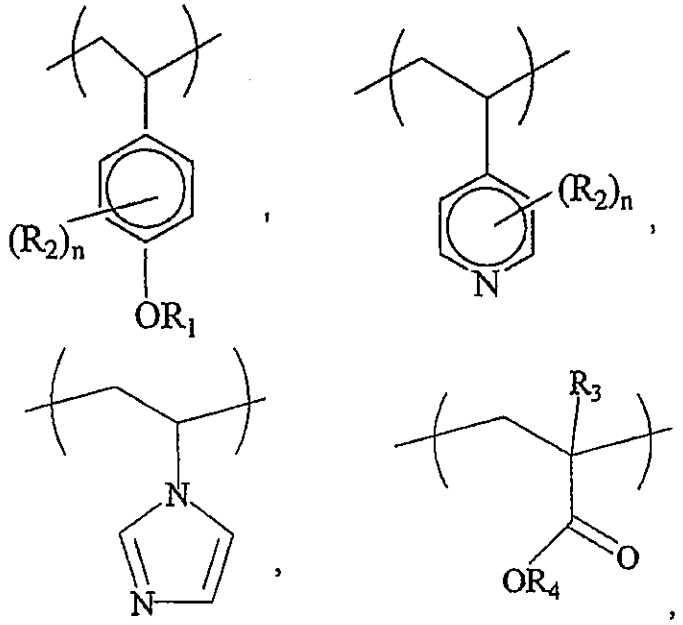
R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols.

Claims:

1. The combination of:

a substrate having a surface; and

a non-covalently crosslinked layer adjacent said surface, said layer formed from a composition comprising a polymer dissolved or dispersed in a solvent system, said polymer being a copolymer comprised of at least two different recurring monomers, said monomers being selected from the group consisting of:



and combinations of the foregoing,

wherein:

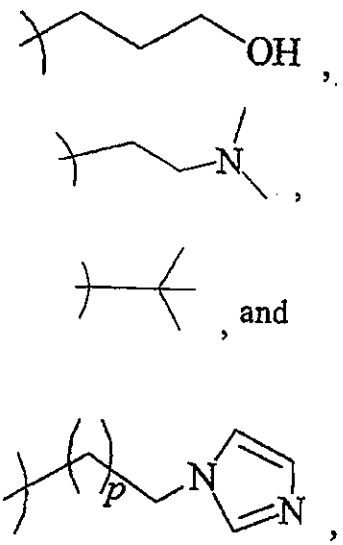
n is 0 to 4;

R_1 is a protecting group;

each R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols;

R_3 is selected from the group consisting of H, C_1-C_5 alkyls, -CN, -Br, and -Cl; and

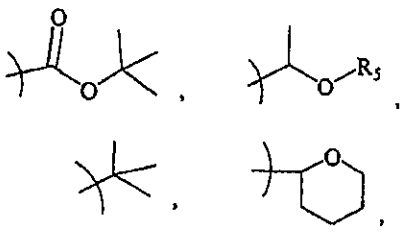
R_4 is selected from the group consisting of C_1-C_6 alkyls,



, and

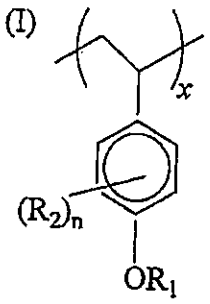
where p is 0-2.

2. The combination of claim 1, wherein R_1 is selected from the group consisting of

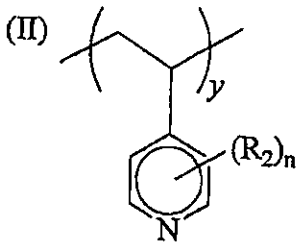


where R_5 is selected from the group consisting of C_1-C_6 alkyls.

3. The combination of claim 1, wherein said recurring monomers are selected from the group consisting of:



and



wherein:

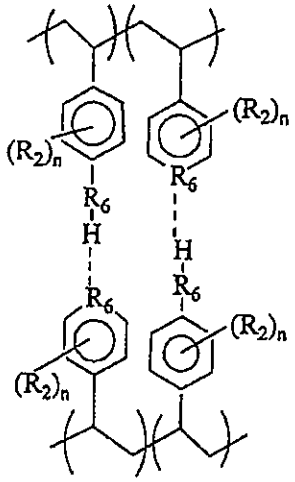
R_1 is a protecting group;

n is 0-4; and

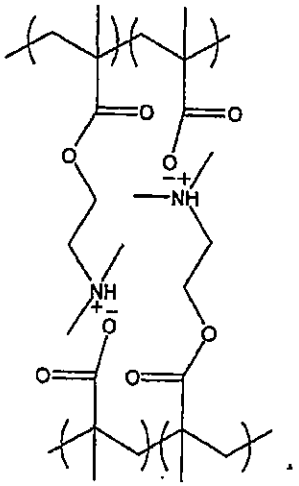
each R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols.

4. The combination of claim 3, wherein the molar ratio of x:y is from 1:3 to 3:1.

5. The combination of claim 1, wherein said non-covalently crosslinked layer comprises crosslinked polymers having a formula selected from the group consisting of



and



wherein:

n is 0-4;

each R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols; and

each R_6 is individually selected from the group consisting of -O- and -N-.

6. The combination of claim 1, wherein at least one of said monomers is a hydrogen donor and the other of said monomers is a hydrogen acceptor.

7. The combination of claim 6, wherein the molar ratio of hydrogen donor to hydrogen acceptor in said polymer is from 1:3 to 3:1.

8. The combination of claim 1, wherein said substrate is a microelectronic substrate.

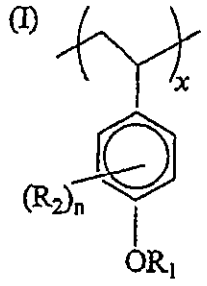
9. The combination of claim 8, said substrate having a surface comprising a plurality of topography features, said topography features forming a dense region and an isolated region on said substrate.

10. The combination of claim 8, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, tantalum nitrite, silicon germanium, silicon dioxide, silicon nitride, aluminum oxide, glass, quartz, and low k dielectrics.

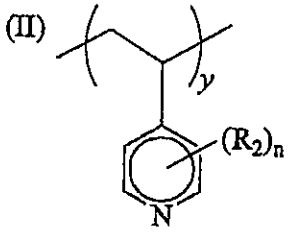
11. The combination of claim 1, wherein said composition is a spin-on carbon composition.

12. The combination of claim 1, wherein said composition is a hardmask.

13. An anti-reflective or fill composition comprising a polymer dispersed or dissolved in a solvent system, said polymer comprising recurring monomers of



and



wherein:

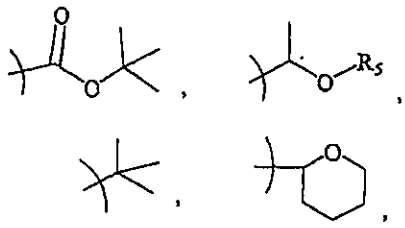
n is 0-4;

the molar ratio of x:y is from 1:3 to 3:1;

R_1 is a protecting group; and

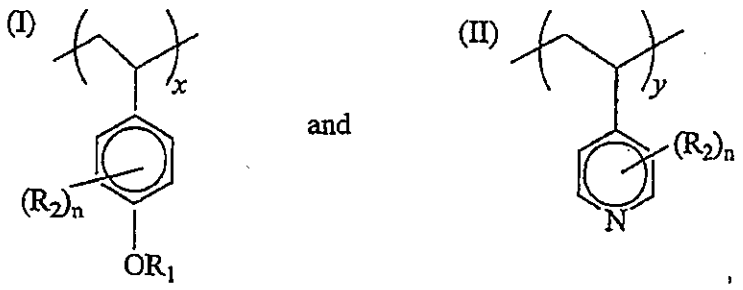
each R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols.

14. The composition of claim 13, wherein R_1 is selected from the group consisting of



where R_5 is selected from the group consisting of C_1-C_6 alkyls.

15. A polymer comprising recurring monomers of

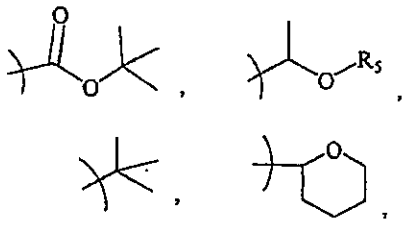


wherein:

n is 0-4;

the molar ratio of x:y is from1:3 to 3:1;

R_1 is selected from the group consisting of



where R_5 is selected from the group consisting of C_1-C_6 alkyls; and

R_2 is individually selected from the group consisting of C_1-C_6 alkyls, halogens, -OH, and multifunctional phenols.