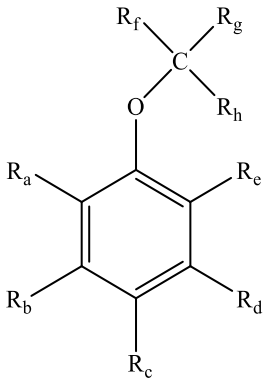
What is claimed is:

1. A rinse comprising

(i) between approximately 15% by weight and approximately 35% by weight of acetic acid and

(ii) between approximately 85% by weight and approximately 65% by weight of a compound having structure B:



wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h may independently be hydrogen, a substituted or an unsubstituted (C_{1-6}) alkyl group, a substituted or an unsubstituted halogenated (C_{1-6}) alkyl group, a substituted or an unsubstituted (C_{1-6}) alkyl carbonyl group, a halogen, or a hydroxy group.

2. The rinse of claim 1, wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

3. The rinse of ~~any of~~ claim~~s~~ 1~~-2~~, wherein the rinse contains approximately 15% by weight of acetic acid.

4. The rinse of ~~any of~~ claim~~s~~ 1~~-2~~, wherein the rinse contains approximately 20% by weight of acetic acid.

5. The rinse of ~~any of~~ claim~~s~~ 1~~-2~~, wherein the rinse contains approximately 25% by weight of acetic acid.

6. The rinse of ~~any of~~ claim~~s~~ 1~~-2~~, wherein the rinse contains approximately 30% by weight of acetic acid.

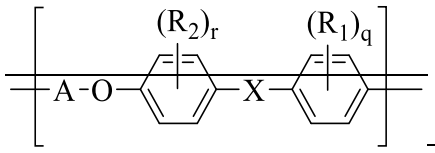
7. The rinse of ~~any of~~ claim~~s~~ 1~~-2~~, wherein the rinse contains approximately 35% by weight of acetic acid.

~~**8.** The rinse of any of claims 1-7, wherein the rinse consists essentially of acetic acid and the compound having structure B.~~

9. The rinse of any of claims 1-7, wherein the rinse consists of acetic acid and the compound having structure B.

10. The rinse of any of claims 1-9, wherein the rinse is adapted for removing an edge protection layer formed from a masking composition comprising

a. a polymer comprising a unit having structure (I):

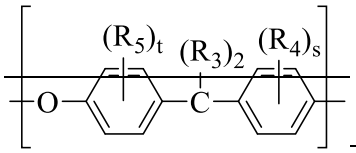


(I),

wherein

X is selected from the group consisting of SO_2, C(=O) and O;

A is a direct bond or A is selected from the group consisting of structure (II):



(II);

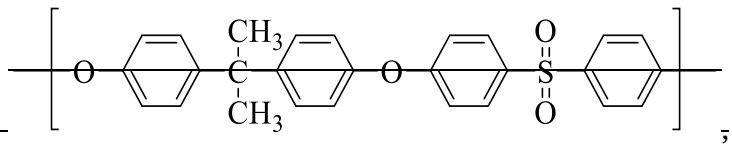
R_1, R_2, R_3, R_4 and R_5 are each independently selected from the group consisting of H, halo, (C_{1-3}) alkyl, (C_{1-3}) fluorinated alkyl, hydroxy, (C_{1-3}) alkoxy, and (C_{1-3}) alkyl carbonyl; and

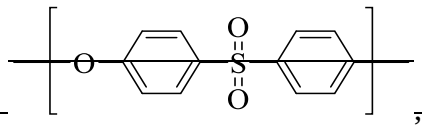
q, r, s and t are each independently selected from the group consisting of 0, 1, 2, 3 and 4; and

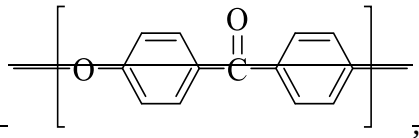
b. an organic solvent,

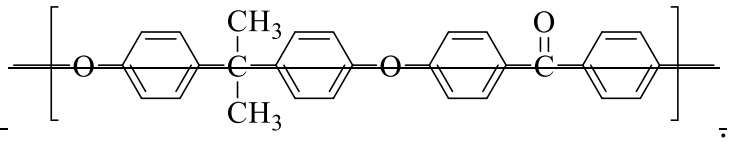
wherein the polymer has an average molecular weight of less than 50000.

11. The rinse of claim 10, wherein the polymer unit having structure (I) includes one of:

a. ,

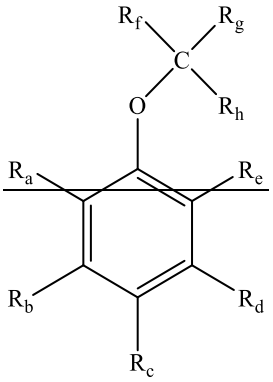
b. ,

~~c.~~  ~~, and~~

~~d.~~  ~~.~~

~~12~~**8.** A method of cleaning a wafer or substrate comprising:

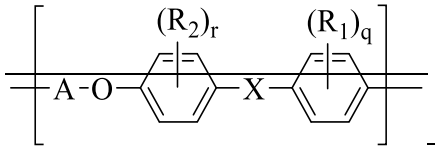
washing the wafer or substrate with a rinse according to claim 1. ~~comprising between approximately 15% by weight and approximately 35% by weight of acetic acid and between approximately 85% by weight and approximately 65% by weight of a compound having structure B:~~



~~wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h may independently be hydrogen, a substituted or an unsubstituted alkyl group, a substituted or an unsubstituted halogenated alkyl group, a substituted or an unsubstituted alkyl carbonyl group, a halogen, and a hydroxy group.~~

~~**13.** The method of claim 12, wherein the edge protection layer is formed from a masking composition comprising~~

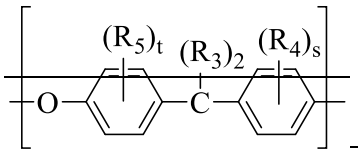
~~**a.** a polymer comprising a unit having structure (I):~~

 ~~(I),~~

~~wherein~~

~~X is selected from the group consisting of $-SO_2-$, $-C(=O)-$ and $-O-$;~~

~~A is a direct bond or A is selected from the group consisting of structure (II):~~



~~(II);~~

~~R_1, R_2, R_3, R_4 and R_5 are each independently selected from the group consisting of H, halo, (C_{1-3}) alkyl, (C_{1-3}) fluorinated alkyl, hydroxy, (C_{1-3}) alkoxy, and (C_{1-3}) alkyl carbonyl; and~~

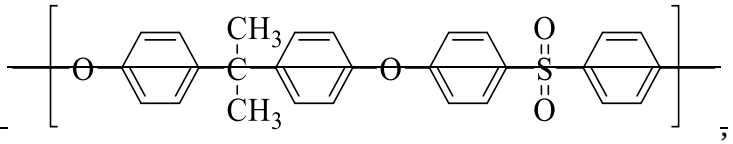
~~q, r, s and t are each independently selected from the group consisting of 0, 1, 2, 3 and 4; and~~

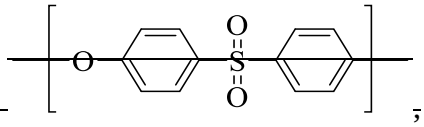
~~**b.** an organic solvent,~~

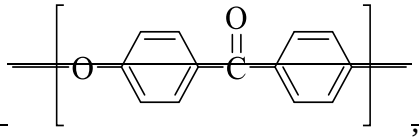
~~wherein the polymer has an average molecular weight of less than 50000.~~

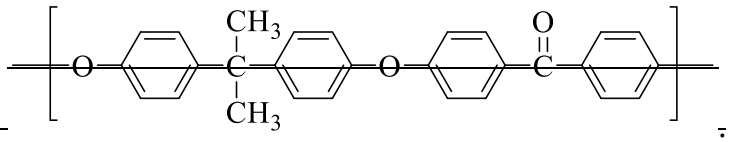
~~**14**~~**9.** The method of ~~any of~~ claim~~s 12-13~~ 8, wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

~~**15.** The method of any of claims 13-14, wherein the polymer unit having structure (I) includes one of:~~

~~**a.**~~  ~~;~~

~~**b.**~~  ~~;~~

~~**c.**~~  ~~, and~~

~~**d.**~~  ~~;~~

~~16~~10. The method of ~~any of~~ claim~~s 12-15~~ 8, wherein the rinse contains approximately 15% by weight of acetic acid and wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

~~17~~11. The method of ~~any of~~ claim~~s 12-15~~ 8, wherein the rinse contains approximately 20% by weight of acetic acid and wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

~~18~~12. The method of ~~any of~~ claim~~s 12-15~~ 8, wherein the rinse contains approximately 25% by weight of acetic acid and wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

~~19~~13. The method of ~~any of~~ claim~~s 12-15~~ 8, wherein the rinse contains approximately 30% by weight of acetic acid and wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

~~20~~14. The method of ~~any of~~ claim~~s 12-15~~ 8, wherein the rinse contains approximately 35% by weight of acetic acid and wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

~~**21.** The method of any of claims 12-20, wherein the rinse consists essentially of acetic acid and the compound having structure B.~~

~~**22.** The method of any of claims 12-20, wherein the rinse consists of acetic acid and the compound having structure B.~~

~~23~~15. The method of ~~any of~~ claim~~s 12-22~~ 8, further comprising one or more steps selected from the group of:

(a) applying a masking agent on an edge and at least one proximate surface of the wafer or substrate;

(b) heating the applied masking agent to form the edge protection layer on the edge and at least one proximate surface of the wafer or substrate;

(c) applying a hardmask composition to the wafer or substrate and the edge protection layer;

(d) removing at least a portion of the applied hardmask composition that is in contact with the edge protection layer, wherein the removing comprises rinsing the hardmask composition with at least one edge bead remover material;

(e) heating the applied hardmask composition to form the hardmask; and

(f) performing at least one post applied bake.

~~**24.** A method of applying and removing an edge protection layer and residual hardmask components from a wafer or substrate comprising:~~

~~**(a)** applying a masking agent on an edge and at least one proximate surface of the wafer or substrate;~~

(b) heating the masking agent to form the edge protection layer on the edge and the at least one proximate surface of the wafer or substrate;

(c) applying a hardmask composition to the wafer or substrate and the edge protection layer;

(d) removing at least a portion of the hardmask composition that is in contact with the edge protection layer, wherein the removing comprises rinsing the hardmask composition with at least one edge bead remover material;

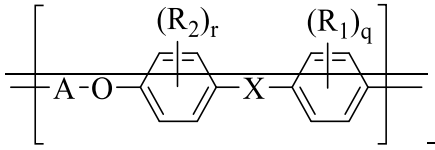
(e) heating the hardmask composition to form the hardmask; and

(f) washing the wafer or substrate with a rinse comprising between approximately 15% by weight and approximately 35% by weight of acetic acid and between approximately 85% by weight and approximately 65% by weight of anisole.

25. The method of claim 24 further compromising performing at least one post applied baking step.

26. The method of any of claims 24-25, wherein the edge protection layer is formed from a masking composition comprising

a. a polymer comprising a unit having structure (I):

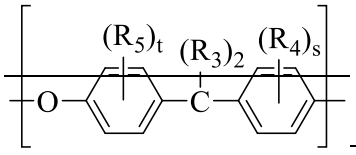


(I),

wherein

X is selected from the group consisting of $-SO_2-$, $-C(=O)-$ and $-O-$;

A is a direct bond or A is selected from the group consisting of structure (II):



(II);

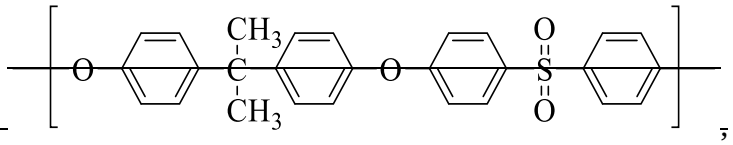
R_1, R_2, R_3, R_4 and R_5 are each independently selected from the group consisting of H, halo, (C_{1-3}) alkyl, (C_{1-3}) fluorinated alkyl, hydroxy, (C_{1-3}) alkoxy, and (C_{1-3}) alkyl carbonyl; and

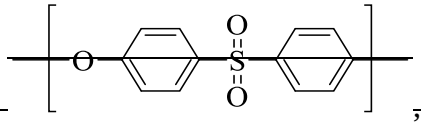
q, r, s and t are each independently selected from the group consisting of 0, 1, 2, 3 and 4; and

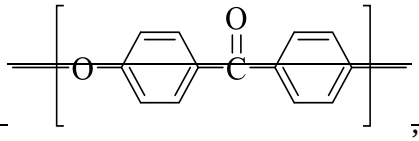
b. an organic solvent,

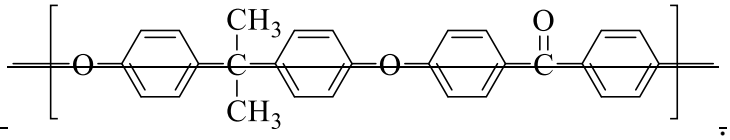
wherein the polymer has an average molecular weight of less than 50,000.

27. The method of claim 26, wherein the polymer unit having structure (I) includes one of:

a. ,

b. ,

c. , and

d. .

28. The method of any of claims 24-27, wherein the rinse contains approximately 15% by weight of acetic acid.

29. The method of any of claims 24-27, wherein the rinse contains approximately 20% by weight of acetic acid.

30. The method of any of claims 24-27, wherein the rinse contains approximately 25% by weight of acetic acid.

31. The method of any of claims 24-27, wherein the rinse contains approximately 30% by weight of acetic acid.

32. The method of any of claims 24-27, wherein the rinse contains approximately 35% by weight of acetic acid.

~~**33.** The method of any of claims 24-32, wherein the rinse consists essentially of acetic acid and anisole.~~

~~**34.** The method of any of claims 24-32, wherein the rinse consists of acetic acid and anisole.~~

~~**35.** The method of any of claims 24-34, wherein the applying a hardmask composition to the wafer or substrate and the edge protection layer comprises a spin-on coating process.~~

~~**36.** The method of claim 35, wherein the spin-on coating process utilizes at least one casting solvent.~~

~~**37.** The method of claim 36, wherein the at least one casting solvent includes at least one of PGMEA, PGME, ethyl lactate, methoxyethanol, ethoxypropanol, ethoxyethanol, 1-pentanol, 4-methyl-2-pentanol and mixtures thereof.~~

~~**38.** The method of any of claims 24-34, wherein the applying a hardmask composition to the wafer or substrate and the edge protection layer comprises a chemical vapor deposition process.~~

~~**39.** The method of any of claims 24-34, wherein the applying a hardmask composition to the wafer or substrate and the edge protection layer comprises an atomic layer deposition process.~~

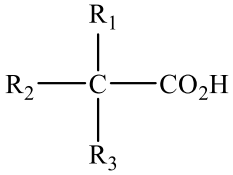
~~**40.** The method of any of claims 24-39, wherein the at least one edge bead remover material is at least one of PGMEA, PGME, ethyl lactate, methoxyethanol, ethoxypropanol, ethoxyethanol, 1-pentanol, 4-methyl-2-pentanol and mixtures thereof.~~

~~**41.** The method of any of claims 24-40, wherein the heating the hardmask composition to form the hardmask comprises heating at a temperature between approximately 150 °C and approximately 450 °C.~~

~~**42.** The method of any of claims 24-41, wherein the heating the hardmask composition to form the hardmask comprises heating for a time between approximately 60 seconds and approximately 120 seconds.~~

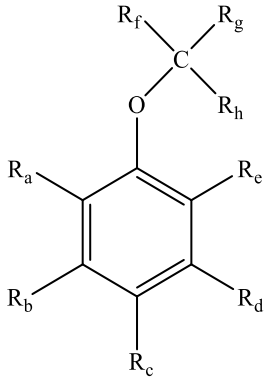
~~43~~16. A rinse comprising

(i) between approximately 1% by weight and approximately 10% by weight of halogenated acetic acid of structure A:



wherein R_1 and R_2 are independently hydrogen or a halogen and R_3 is a halogen; and

(ii) between approximately 99% by weight and approximately 90% by weight of a compound having structure B:



wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h may independently be hydrogen, a substituted or an unsubstituted (C_{1-6}) alkyl group, a substituted or an unsubstituted halogenated (C_{1-6}) alkyl group, a substituted or an unsubstituted (C_{1-6}) alkyl carbonyl group, a halogen, or a hydroxy group.

44<u>17</u>. The rinse of claim ~~43~~ <u>16</u>, wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

~~**45.** The rinse of any of claims 43-44, wherein the rinse contains approximately 1% by weight of the halogenated acetic acid of structure A.~~

~~**46.** The rinse of any of claims 43-44, wherein the rinse contains approximately 2% by weight of the halogenated acetic acid of structure A.~~

~~**47.** The rinse of any of claims 43-44, wherein the rinse contains approximately 4% by weight of the halogenated acetic acid of structure A.~~

~~**48.** The rinse of any of claims 43-44, wherein the rinse contains approximately 7% by weight of the halogenated acetic acid of structure A.~~

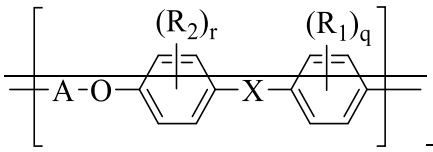
~~**49.** The rinse of any of claims 43-44, wherein the rinse contains approximately 10% by weight of the halogenated acetic acid of structure A.~~

~~**50.** The rinse of any of claims 43-49, wherein the rinse consists essentially of the halogenated acetic acid of structure A and the compound having structure B.~~

~~**51.** The rinse of any of claims 43-49, wherein the rinse consists of the halogenated acetic acid of structure A and the compound having structure B.~~

~~**52.** The rinse of any of claims 43-51, wherein the rinse is adapted for removing an edge protection layer formed from a masking composition comprising~~

a. a polymer comprising a unit having structure (I):

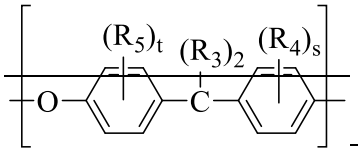


(I),

wherein

X is selected from the group consisting of $-SO_2-$, $-C(=O)-$ and $-O-$;

A is a direct bond or A is selected from the group consisting of structure (II):



(II);

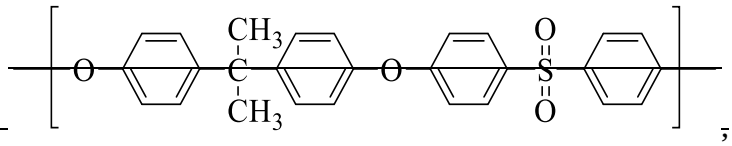
R_1, R_2, R_3, R_4 and R_5 are each independently selected from the group consisting of H, halo, (C_{1-3}) alkyl, (C_{1-3}) fluorinated alkyl, hydroxy, (C_{1-3}) alkoxy, and (C_{1-3}) alkyl carbonyl; and

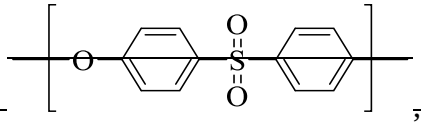
q, r, s and t are each independently selected from the group consisting of 0, 1, 2, 3 and 4; and

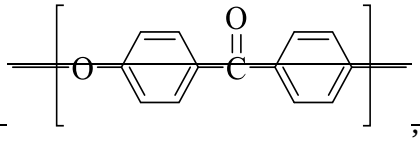
b. an organic solvent,

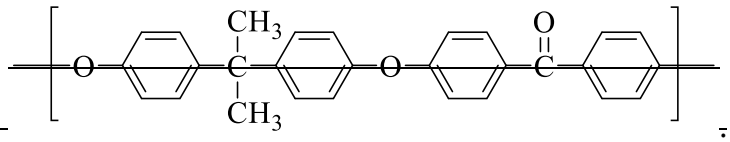
wherein the polymer has an average molecular weight of less than 50,000.

53. The rinse of claim 52, wherein the polymer unit having structure (I) includes one of:

a. ;

b. ;

c. , and

~~d.~~  ~~;~~

~~54~~18. The rinse of ~~any of~~ claim~~s 43-53~~ 16, wherein in the halogenated acetic acid of structure A R_1 and R_2 are each hydrogen and R_3 is a halogen selected from among fluorine, bromine, iodine and chlorine

~~55~~19. The rinse of ~~any of~~ claim~~s 43-53~~ 16, wherein in the halogenated acetic acid of structure A two or more of R_1, R_2 and R_3 is a halogen selected from among fluorine, bromine, iodine and chlorine.

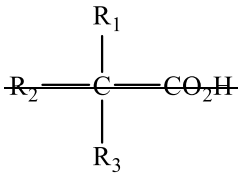
~~56~~20. The rinse of ~~any of~~ claim~~s 43-53~~ 16, wherein the halogenated acetic acid of structure A is difluoroacetic acid and wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

~~57~~21. The rinse of ~~any of~~ claim~~s 43-53~~ 16, wherein the halogenated acetic acid of structure A is trifluoroacetic acid and wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

~~**58.** The rinse of any of claims 43-53, wherein in the halogenated acetic acid of structure A two or more of R_1, R_2 and R_3 is a different halogen selected from among fluorine, bromine, iodine and chlorine.~~

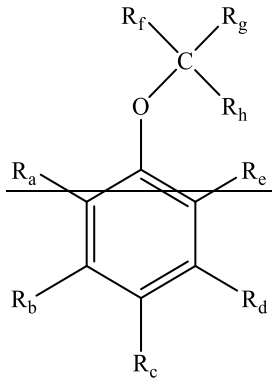
~~59~~22. A method of cleaning a wafer or substrate comprising:

washing the wafer or substrate with a rinse according to claim 16. ~~comprising (i) between approximately 1% by weight and approximately 10% by weight of halogenated acetic acid of structure A:~~



~~wherein R_1 and R_2 are independently hydrogen or a halogen and R_3 is a halogen; and~~

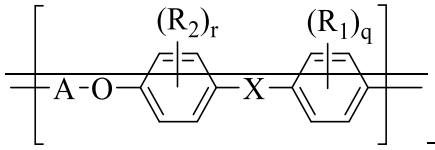
~~(ii) between approximately 99% by weight and approximately 90% by weight of a compound having structure B:~~



wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h may independently be hydrogen, a substituted or an unsubstituted (C_{1-6}) alkyl group, a substituted or an unsubstituted halogenated (C_{1-6}) alkyl group, a substituted or an unsubstituted (C_{1-6}) alkyl carbonyl group, a halogen, or a hydroxy group.

60. The method of claim 59, wherein the edge protection layer is formed from a masking composition comprising

a. a polymer comprising a unit having structure (I):

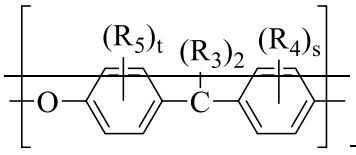


(I),

wherein

X is selected from the group consisting of $-SO_2-$, $-C(=O)-$ and $-O-$;

A is a direct bond or A is selected from the group consisting of structure (II):



(II);

R_1, R_2, R_3, R_4 and R_5 are each independently selected from the group consisting of H, halo, (C_{1-3}) alkyl, (C_{1-3}) fluorinated alkyl, hydroxy, (C_{1-3}) alkoxy, and (C_{1-3}) alkyl carbonyl; and

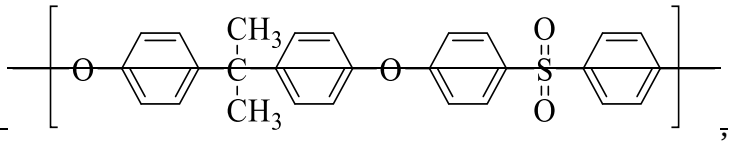
q, r, s and t are each independently selected from the group consisting of 0, 1, 2, 3 and 4; and

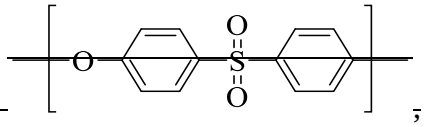
b. an organic solvent,

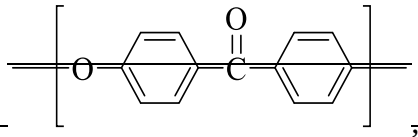
~~wherein the polymer has an average molecular weight of less than 50,000.~~

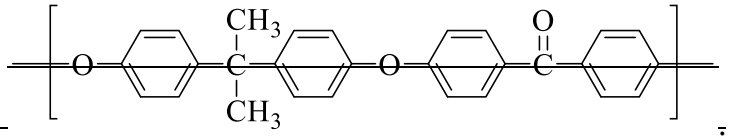
61. The method of any of claims 59-60, wherein each of R_a, R_b, R_c, R_d, R_e, R_f, R_g and R_h in structure B is hydrogen.

62. The method of any of claims 60-61, wherein the polymer unit having structure (I) includes one of:

a. ,

b. ,

c. , and

d. .

63. The method of any of claims 59-62, wherein the rinse contains approximately 1% by weight of the halogenated acetic acid of structure A.

64. The method of any of claims 59-62, wherein the rinse contains approximately 2% by weight of the halogenated acetic acid of structure A.

65. The method of any of claims 59-62, wherein the rinse contains approximately 4% by weight of the halogenated acetic acid of structure A.

66. The method of any of claims 59-62, wherein the rinse contains approximately 7% by weight of the halogenated acetic acid of structure A.

67. The method of any of claims 59-62, wherein the rinse contains approximately 10% by weight of the halogenated acetic acid of structure A.

~~**68.** The method of any of claims 59-67, wherein the rinse consists essentially of the halogenated acetic acid of structure A and the compound having structure B.~~

~~**69.** The method of any of claims 59-67, wherein the rinse consists of the halogenated acetic acid of structure A and the compound having structure B.~~

~~70~~23. The method of ~~any of~~ claim~~s 59-69~~ 22, further comprising one or more steps selected from the group of:

(a) applying a masking agent on an edge and at least one proximate surface of the wafer or substrate;

(b) heating the applied masking agent to form the edge protection layer on the edge and at least one proximate surface of the wafer or substrate;

(c) applying a hardmask composition to the wafer or substrate and the edge protection layer;

(d) removing at least a portion of the applied hardmask composition that is in contact with the edge protection layer, wherein the removing comprises rinsing the hardmask composition with at least one edge bead remover material;

(e) heating the applied hardmask composition to form the hardmask; and

(f) performing at least one post applied bake.

~~**71.** The method of any of claims 59-70, wherein in the halogenated acetic acid of structure A R_1 and R_2 are each hydrogen and R_3 is a halogen selected from among fluorine, bromine, iodine and chlorine~~

~~**72.** The method of any of claims 59-70, wherein in the halogenated acetic acid of structure A two or more of R_1, R_2 and R_3 is a halogen selected from among fluorine, bromine, iodine and chlorine.~~

~~**73.** The method of any of claims 59-70, wherein the halogenated acetic acid of structure A is difluoroacetic acid.~~

~~**74.** The method of any of claims 59-70, wherein the halogenated acetic acid of structure A is trifluoroacetic acid.~~

~~**75.** The method of any of claims 59-70, wherein in the halogenated acetic acid of structure A two or more of R_1, R_2 and R_3 is a different halogen selected from among fluorine, bromine, iodine and chlorine.~~

76. A method of applying and removing an edge protection layer and residual hardmask components from a wafer or substrate comprising:

(a) applying a masking agent on an edge and at least one proximate surface of the wafer or substrate;

(b) heating the masking agent to form the edge protection layer on the edge and the at least one proximate surface of the wafer or substrate;

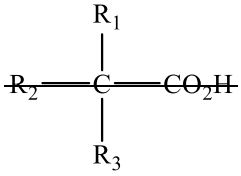
(c) applying a hardmask composition to the wafer or substrate and the edge protection layer;

(d) removing at least a portion of the hardmask composition that is in contact with the edge protection layer, wherein the removing comprises rinsing the hardmask composition with at least one edge bead remover material;

(e) heating the hardmask composition to form the hardmask; and

(f) washing the wafer or substrate with a rinse comprising

(i) between approximately 1% by weight and approximately 10% by weight of halogenated acetic acid of structure A:



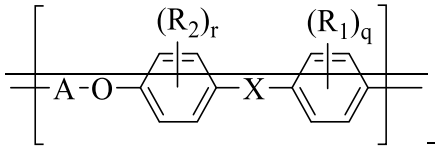
wherein R_1 and R_2 are independently hydrogen or a halogen and R_3 is a halogen, and

(ii) between approximately 99% by weight and approximately 99% by weight of anisole.

77. The method of claim 76 further compromising performing at least one post applied baking step.

78. The method of any of claims 76-77, wherein the edge protection layer is formed from a masking composition comprising

a. a polymer comprising a unit having structure (I):

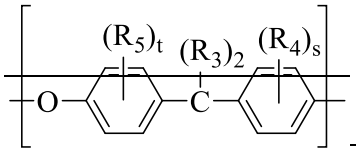


(I),

wherein

X is selected from the group consisting of SO_2-, -C(=O)- and -O-;

A is a direct bond or A is selected from the group consisting of structure (II):



(II);

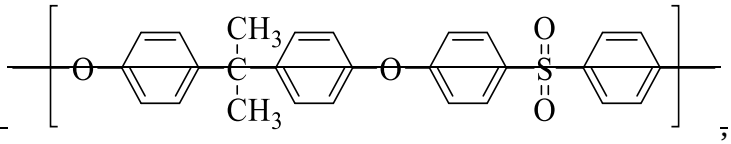
R_1, R_2, R_3, R_4 and R_5 are each independently selected from the group consisting of H, halo, (C_{1-3}) alkyl, (C_{1-3}) fluorinated alkyl, hydroxy, (C_{1-3}) alkoxy, and (C_{1-3}) alkyl carbonyl; and

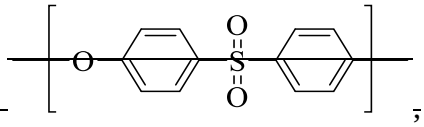
q, r, s and t are each independently selected from the group consisting of 0, 1, 2, 3 and 4; and

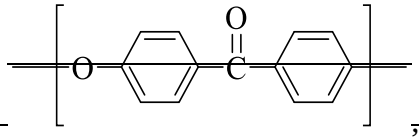
b. an organic solvent,

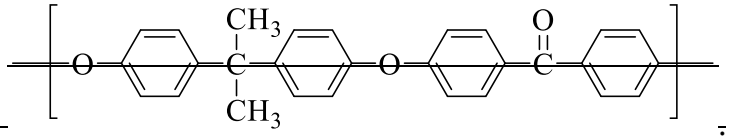
wherein the polymer has an average molecular weight of less than 50000.

79. The method of claim 78, wherein the polymer unit having structure (I) includes one of:

a. ;

b. ;

c. , and

d. ;

80 The method of any of claims 76-79, wherein the rinse contains approximately 1% by weight of the halogenated acetic acid of structure A.

81 The method of any of claims 76-79, wherein the rinse contains approximately 2% by weight of the halogenated acetic acid of structure A.

82. The method of any of claims 76-79, wherein the rinse contains approximately 4% by weight of the halogenated acetic acid of structure A.

83. The method of any of claims 76-79, wherein the rinse contains approximately 7% by weight of the halogenated acetic acid of structure A.

84. The method of any of claims 76-79, wherein the rinse contains approximately 10% by weight of the halogenated acetic acid of structure A.

85. The method of any of claims 76-84, wherein the rinse consists essentially of the halogenated acetic acid of structure A and anisole.

86. The method of any of claims 76-84, wherein the rinse consists of the halogenated acetic acid of structure A and anisole.

87. The method of any of claims 76-86, wherein the applying a hardmask composition to the wafer or substrate and the edge protection layer comprises a spin-on coating process.

88. The method of claim 87, wherein the spin-on coating process utilizes at least one casting solvent.

89. The method of claim 88, wherein the at least one casting solvent includes at least one of PGMEA, PGME, ethyl lactate, methoxyethanol, ethoxypropanol, ethoxyethanol, 1-pentanol, 4-methyl-2-pentanol and mixtures thereof.

90. The method of any of claims 76-86, wherein the applying a hardmask composition to the wafer or substrate and the edge protection layer comprises a chemical vapor deposition process.

91. The method of any of claims 76-86, wherein the applying a hardmask composition to the wafer or substrate and the edge protection layer comprises an atomic layer deposition process.

92. The method of any of claims 76-91, wherein the at least one edge bead remover material is at least one of PGMEA, PGME, ethyl lactate, methoxyethanol, ethoxypropanol, ethoxyethanol, 1-pentanol, 4-methyl-2-pentanol and mixtures thereof.

~~**93.** The method of any of claims 76-92, wherein the heating the hardmask composition to form the hardmask comprises heating at a temperature between approximately 150 °C and approximately 450 °C.~~

94. The method of any of claims 76-93, wherein the heating the hardmask composition to form the hardmask comprises heating for a time between approximately 60 seconds and approximately 120 seconds.

95. The method of any of claims 76-94, wherein in the halogenated acetic acid of structure A R_1 and R_2 are each hydrogen and R_3 is a halogen selected from among fluorine, bromine, iodine and chlorine

96. The method of any of claims 76-94, wherein in the halogenated acetic acid of structure A two or more of R_1, R_2 and R_3 is a halogen selected from among fluorine, bromine, iodine and chlorine.

97. The method of any of claims 76-94, wherein the halogenated acetic acid of structure A is difluoroacetic acid.

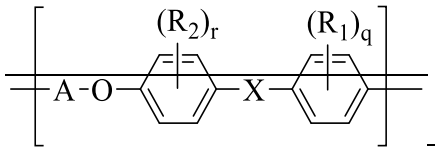
98. The method of any of claims 76-94, wherein the halogenated acetic acid of structure A is trifluoroacetic acid.

99. The method of any of claims 76-94, wherein in the halogenated acetic acid of structure A two or more of R_1, R_2 and R_3 is a different halogen selected from among fluorine, bromine, iodine and chlorine.

100. The use of a rinse according to any one of claims 1 to 11 or 43 to 58 for removing an edge protection layer and/or residual hardmask components.

101. The use according to claim 101, wherein the edge protection layer comprises

a. a polymer comprising a unit having structure (I):

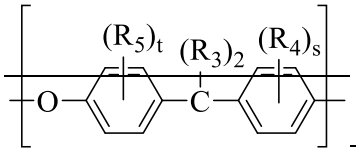


(I),

wherein

X is selected from the group consisting of $-SO_2-$, $-C(=O)-$ and $-O-$;

A is a direct bond or A is selected from the group consisting of structure (II):



(II);

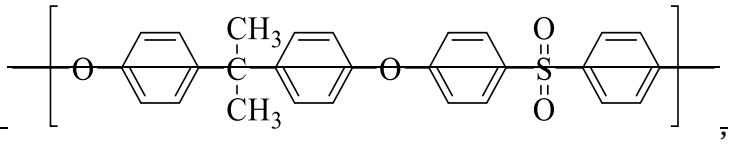
R_1, R_2, R_3, R_4 and R_5 are each independently selected from the group consisting of H, halo, (C_{1-3}) alkyl, (C_{1-3}) fluorinated alkyl, hydroxy, (C_{1-3}) alkoxy, and (C_{1-3}) alkyl carbonyl; and

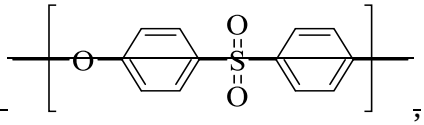
q, r, s and t are each independently selected from the group consisting of 0, 1, 2, 3 and 4; and

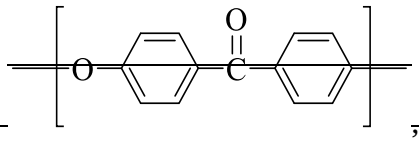
b. an organic solvent,

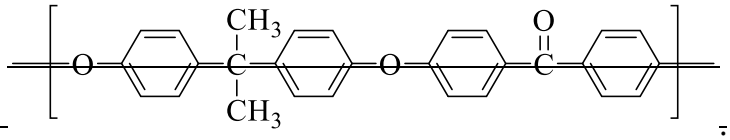
wherein the polymer has an average molecular weight of less than 50000.

102. The use according to claim 102, wherein the polymer unit having structure (I) includes one of:,

a. ,

b. ,

c. , and

d. .