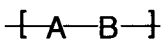
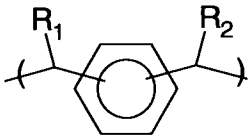
Claims

1. An antireflective coating composition comprising a crosslinker and a crosslinkable polymer capable of being crosslinked by the crosslinker, where the crosslinkable polymer comprises a unit represented by structure (1):



(1)

where A is a fused aromatic ring and B has a structure (2),



(2)

where R_1 is C_1-C_4alkyl and R_2 is C_1-C_4alkyl.

2 The composition of claim 1, where the polymer in the composition is free of aliphatic polycyclic moieties.

3. The composition of claim 1 or 2, where R_1 is methyl and R_2 is methyl.

4. The composition of any one of claims 1 to 3, where the fused aromatic ring has 2 to 5, preferably 3 or 4 aromatic rings.

5. The composition of any one of claims 1 to 4, where the composition further comprises an, preferably thermal, acid generator.

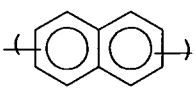
6. The composition of any one of claims 1 to 5, wherein the polymer has a weight average molecular weight of 1,200 to 10,000.

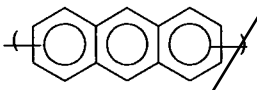
7. The composition of any one of claims 1 to 6 further comprising a surfactant.

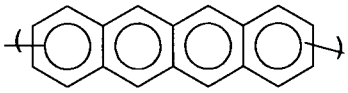
8. The composition of any one of claims 1 to 7 further comprising a second polymer, where the second polymer comprises a hydroxyaromatic moiety, and preferably is free of aliphatic polycyclics.

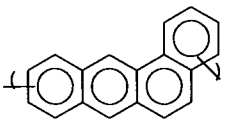
9. The composition or polymer of any one of claims 1 to 8 having a carbon content of greater than 80 weight% by solid content.

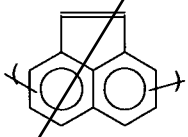
10. The composition of any one of claims 1 to 9, where A in structure 1 is selected from

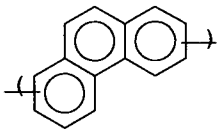

(1)

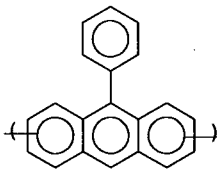

(2)


(3)


(4)


(5)


(6)


(7)

11. A process for manufacturing a microelectronic device, comprising;

a) providing a substrate with a first layer of an antireflective coating composition from any one of claims 1 to 10;

b) optionally, providing at least a second antireflective coating layer over the first antireflective coating composition layer;

b) coating a photoresist layer above the antireflective coating layers;

c) imagewise exposing the photoresist layer;

d) developing the photoresist layer with an aqueous alkaline developing solution.

12. The process of claim 11, where the first antireflective coating layer has k value in the range of about 0.05 to about 1.0 and/or second antireflective coating layer has k value in the range of about 0.05 to about 0.5.

13. The process of claim 11 or 12, where the second antireflective coating comprises silicon.

14. The process of any one of claims 11 to 13, where the photoresist is imageable with radiation from about 240 nm to about 12 nm.

15. The process according to any one of claims 11 to 14, where the developing solution is an aqueous solution comprising a hydroxide base.

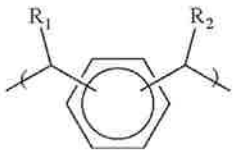
CLAIMS

1. An antireflective coating composition comprising a crosslinker and a crosslinkable polymer capable of being crosslinked by the crosslinker, where the crosslinkable polymer comprises a unit represented by structure (1):



(1)

where A is a fused aromatic ring comprising 3 to 5 fused aromatic rings and which further is unsubstituted or substituted with one or more organo constituents selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, alkylaryl, haloalkyls, hydroxyl, amino, aminoalkyl, and alkoxy, and B has a structure (2),



(2)

where R1 is C1-C4alkyl and R2 is C1-C4alkyl, and where the composition further comprises an acid generator.

2. The composition of claim 1, where the polymer in the composition is free of aliphatic polycyclic moieties.

3. The composition of claim 1, where R1 is methyl and R2 is methyl.

4. The composition of claim 1, where the acid generator is a thermal acid generator.

5. The composition of claim 1, wherein the polymer has a weight average molecular weight of 1,200 to 10,000.

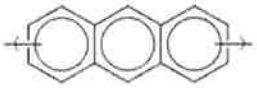
6. The composition of claim 1 further comprising a surfactant.

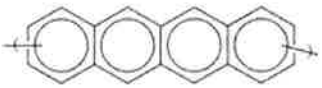
7. The composition of claim 1 further comprising a second polymer, where the second polymer comprises a hydroxyaromatic moiety.

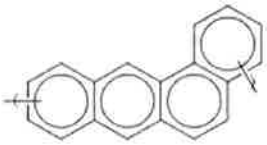
8. The composition of claim 1 further comprising a second polymer, where the second polymer comprises a hydroxyaromatic moiety and is free of aliphatic polycyclics.

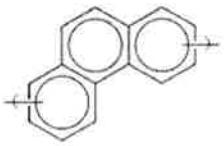
9. The composition of claim 1 having a carbon content of greater than 80 weight % by solid content.

10. The composition of claim 1, where A in structure 1 is selected from the group consisting of

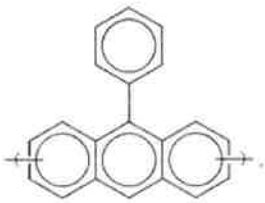
(2) 

(3) 

(4) 

(6) 

and

(7) 

wherein one or more of these structures is present.

11. A process for manufacturing a microelectronic device, comprising;

a) providing a substrate with a first layer of an antireflective coating composition from claim 1;

b) optionally, providing at least a second antireflective coating layer over the first antireflective coating composition layer;

c) coating a photoresist layer above the antireflective coating layers;

d) imagewise exposing the photoresist layer with radiation in the deep and extreme ultraviolet (uv) region;

e) developing the photoresist layer with an aqueous alkaline developing solution.

12. The process of claim 11, where the first antireflective coating layer has k value as measured by ellipsometry in the range of about 0.05 to about 1.0.

13. The process of claim 11, where the second antireflective coating comprises silicon.

14. The process of claim 11, where the second antireflective coating layer has k value as measured by ellipsometry in the range of about 0.05 to about 0.5.

15. The process of claim 11, where the photoresist is imageable with radiation from about 240 nm to about 12 nm.

16. The process of claim 11 where the developing solution is an aqueous solution comprising a hydroxide base.

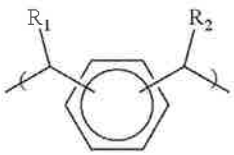
17. A process for manufacturing a microelectronic device, comprising:

a) providing a substrate with a first layer of an antireflective coating composition comprising a crosslinker and a crosslinkable polymer capable of being crosslinked by the crosslinker, where the crosslinkable polymer comprises a unit represented by structure (1):



(1)

where A is a fused aromatic ring comprising 3 to 5 fused aromatic rings and which further is unsubstituted or substituted with one or more organo constituents selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, alkylaryl, haloalkyls, hydroxyl, amino, aminoalkyl, and alkoxy, and B has a structure (2),



(2)

where R1 is C1-C4alkyl and R2 is C1-C4alkyl,

b) optionally, providing at least a second antireflective coating layer over the first antireflective coating composition layer;

c) coating a photoresist layer above the antireflective coating layers;

d) imagewise exposing the photoresist layer with radiation in the deep and extreme ultraviolet (uv) region;

e) developing the photoresist layer with an aqueous alkaline developing solution.