We Claim:

1. An aqueous acidic solution containing

- hydrofluoric acid;
- nitric acid; and
- at least one anionic polyether, which is surface active.

2. The aqueous acidic solution according to claim 1, characterized in that the anionic polyether, which is surface active, is selected from the group consisting of linear and branched, water-soluble and water-dispersible alkylene oxide homopolymers and copolymers and mixtures thereof; wherein at least one end group of a linear alkylene oxide homopolymer or copolymer is an anionic group selected from the group consisting of carboxylate, sulfate, sulfonate, phosphate, diphosphate, phosponate, and polyphosphate groups; and wherein the end group of at least one branch of a branched alkylene oxide homopolymer or copolymer is an anionic group selected from the group consisting of carboxylate, sulfate, sulfonate, phosphate, diphosphate, phosphonate, and polyphosphate groups.

3. The aqueous acidic solution according to claim 2, characterized in that the end group is a sulfate group.

4. The aqueous acidic solution according to claim 2 or 3, characterized in that on the average at least 40% of the end groups of a branched alkylene oxide homopolymer or copolymer are anionic groups.

5. The aqueous acidic solution according to anyone of the claims 2 to 4, characterized in that the alkylene oxide is selected from the group consisting of ethyleneoxide, propyleneoxide and mixtures thereof.

6. The aqueous acidic solution according to anyone of the claims 2 to 5, characterized in that the linear and branched alkylene oxide copolymers contain the comonomer units in statistical, alternating or blocklike distribution.

7. The aqueous acidic solution according to anyone of the claims 2 to 6, characterized in that the alkylene oxide is selected from the group consisting of ethyleneoxide, propyleneoxide and mixtures thereof.

8. The aqueous acidic solution according to anyone of the claims 2 to 7, characterized in that the branched alkylene oxide homopolymers and copolymers are preparable by polymerizing one alkylene oxide or copolymerizing at least 2 different alkylene oxides using at least one polyol having at least 3 hydroxy groups as the starter molecule; and converting one hydroxy end group of at least one branch into an anionic group.

9. The aqueous acidic solution according to claim 8, characterized in that the polyol is selected from the group consisting of aliphatic, cycloaliphatic and aromatic polyols and oligomers and polymers thereof.

10. The aqueous acidic solution according to anyone of the claims 1 to 9, characterized in that it contains, based on the complete weight of the solution, 1 ppm to 0.1% by weight of at least one anionic polyether, which is surface active.

11. The aqueous acidic solution according to anyone of the claims 1 to 10, characterized in that it contains, based on the complete weight of the solution, 0.5 to 50% by weight of hydrofluoric acid.

12. The aqueous acidic solution according to anyone of the claims 1 to 11, characterized in that it contains, based on the complete weight of the solution, 0.5 to 50% by weight of nitric acid.

13. The aqueous acidic solution according to anyone of the claims 1 to 12, characterized in that it contains at least one acid different from hydrofluoric and nitric acid.

14. The aqueous acidic solution according to claim 13, characterized in that the acid is selected from the group consisting of acetic acid, sulfuric acid, phosphoric acid and hexafluorosilicic acid.

15. The use of the aqueous acidic solution according to anyone of the claims 1 to 14 for single-sided etching processes and the production of debonding areas in the manufacture of devices generating electricity upon the exposure to electromagnetic radiation, for the production of rough surfaces as used in wafer bonding processes, for the production of bactericidal structures, and of the production of anti-adhesive structures.

16. An aqueous acidic etching solution suitable for texturizing the surface of single crystal and polycrystal silicon substrates, the said solution containing

- hydrofluoric acid;
- nitric acid; and
- at least one anionic polyether, which is surface active.

17. The aqueous acidic etching solution according to claim 17, characterized in that the anionic polyether, which is surface active, is selected from the group consisting of linear and branched, water-soluble and water-dispersible alkylene oxide homopolymers and copolymers and mixtures thereof; wherein at least one end group of a linear alkylene oxide homopolymer or copolymer is an anionic group selected from the group consisting of carboxylate, sulfate, sulfonate, phosphate, diphosphate, phosponate, and polyphosphate groups; and wherein the end group of at least one branch of a branched alkylene oxide homopolymer or copolymer is an anionic group selected from the group consisting of carboxylate, sulfate, sulfonate, phosphate, diphosphate, phosphonate, and polyphosphate groups.

18. The aqueous acidic etching solution according to claim 17, characterized in that the end group is a sulfate group.

19. The aqueous acidic etching solution according to claim 17 or 18, characterized in that on the average at least 40% of the end groups of a branched alkylene oxide homopolymer or copolymer are anionic groups.

20 The aqueous acidic etching solution according to anyone of the claims 17 to 19, characterized in that the alkylene oxide is selected from the group consisting of ethyleneoxide, propyleneoxide and mixtures thereof.

21. The aqueous acidic etching solution according to anyone of the claims 17 to 20, characterized in that the linear and branched alkylene oxide copolymers contain the comonomer units in statistical, alternating or blocklike distribution.

22. The aqueous acidic etching solution according to anyone of the claims 17 to 21, characterized in that the alkylene oxide is selected from the group consisting of ethyleneoxide, propyleneoxide and mixtures thereof.

23. The aqueous acidic etching solution according to anyone of the claims 17 to 22, characterized in that the branched alkylene oxide homopolymers and copolymers are preparable by polymerizing one alkylene oxide or copolymerizing at least 2 different alkylene oxides using at least one polyol having at least 3 hydroxy groups as the starter molecule; and converting one hydroxy end group of at least one branch into an anionic group.

24. The aqueous acidic etching solution according to claim 23, characterized in that the polyol is selected from the group consisting of aliphatic, cycloaliphatic and aromatic polyols and oligomers and polymers thereof.

25. The aqueous acidic etching solution according to anyone of the claims 16 to 24, characterized in that it contains, based on the complete weight of the solution, 1 ppm to 0.1% by weight of at least one anionic polyether, which is surface active.

26. The aqueous acidic etching solution according to anyone of the claims 16 to 25, characterized in that it contains, based on the complete weight of the solution, 0.5 to 50% by weight of hydrofluoric acid.

27. The aqueous acidic etching solution according to anyone of the claims 16 to 26, characterized in that it contains, based on the complete weight of the solution, 0.5 to 50% by weight of nitric acid.

28. The aqueous acidic etching solution according to anyone of the claims 16 to 27, characterized in that it contains at least one acid different from hydrofluoric and nitric acid.

29. The aqueous acidic etching solution according to claim 28, characterized in that the acid is selected from the group consisting of acetic acid, sulfuric acid, phosphoric acid and hexafluorosilicic acid.

30. A method for texturizing the surface of single crystal and polycrystal silicon substrates comprising the steps of

(1) contacting at least one major surface of a single crystal or polycrystal silicon substrate with an aqueous acidic etching solution according to anyone of the claims 16 to 29;

(2) etching the at least one major surface of a single crystal or polycrystal silicon substrate for a time and at a temperature sufficient to obtain a surface texturization consisting of recesses and protrusions; and

(3) removing the at least one major surface of the single crystal or polycrystal silicon substrate from the contact with the aqueous acidic etching solution.

31. The method according to claim 30, characterized in that the two opposite major surfaces of the single crystal or polycrystal silicon substrate are contacted with the aqueous acidic etching solution in the process step (1).

32. The method according to claim 31, characterized in that the contact is effectuated by dipping the single crystal or polycrystal silicon substrate entirely into the aqueous acidic etching solution in the process step (1).

33. The method according to anyone of the claims 30 to 32, characterized in that the at least one major surface of the single crystal or polycrystal silicon substrate is etched for 1 to 10 minutes at a temperature of from 0 to 50°C in the process step (2).

34. The method according to anyone of the claims 30 to 33, characterized in that the surface texturization obtained in the process step (2) consists of a multitude of pits having a depth in the range of from 0.1 to 15 µm and a diameter in the range of from 0.1 to 15 µm.

35. The method according to claim 34, characterized in that the pits are closed to more than 180°.

36. The method according to claim 34 or 35, characterized in that the pits are deeper than wide, in at least one direction.

37. The method according to anyone of the claims 34 to 36, characterized in that the pits are elongated ribbon-like depressions.

38. The method of anyone of the claims 30 to 37, characterized in that the single crystal or polycrystal silicon substrate is entirely removed from the aqueous acidic etching solution in the process step (3).

39. A method for manufacturing devices generating electricity upon the exposure to electromagnetic radiation, characterized in that the aqueous acidic etching solution according to anyone of the claims 16 to 29 and the method for texturizing the surface of single crystal and polycrystal silicon substrates according to anyone of the claims 30 to 38 are used.

40. The method of claim 39, characterized in that the electromagnetic radiation is solar light.

41. The method of claim 40, characterized in that the devices are photovoltaic cells and solar cells.

42. The use of the aqueous acidic etching solution according to anyone of the claims 16 to 29 for manufacturing electrical, mechanical and optical devices.

43. The use of anionic polyethers, which are surface active, for manufacturing devices generating electricity upon the exposure to electromagnetic radiation.

We claim:

1. An aqueous acidic solution comprising:

2-50% hydrofluoric acid;

nitric acid; and

at least one polymeric surface active anionic polyether selected from the group consisting of linear and branched surface active anionic polyether copolymers,

wherein said solution provides pits, more than 50% of said pits having a depth in the range of from 0.1 to 15 μm and a diameter in the range of from 0.1 to 15 μm, on a surface of both single crystal and polycrystal silicon substrates when said solution is contacted with said surface for 1 to 10 minutes at a temperature of from 0 to 50° C.

2. The aqueous acidic solution according to claim 1, wherein the polymeric surface active anionic polyether is selected from the group consisting of a linear water soluble and water dispersible alkylene oxide copolymer, a branched water soluble and water dispersible alkylene oxide copolymer, and any mixture thereof;

at least one end group of the linear alkylene oxide copolymer is an anionic group selected from the group consisting of a carboxylate group, a sulphate group, a sulfonate group, a phosphate group, a diphosphate group, a phosphonate group, and a polyphosphate group; and

an end group of at least one branch of the branched alkylene oxide copolymer is an anionic group selected from the group consisting of a carboxylate group, a sulphate group, a sulfonate group, a phosphate group, a diphosphate group, a phosphonate group, and a polyphosphate group.

3. The aqueous acidic solution according to claim 2, wherein the end group of the linear or branched alkylene oxide copolymer is a sulfate group.

4. The aqueous acidic solution according to claim 2, wherein at least 40% of the end groups of a branched alkylene oxide copolymer are anionic groups.

5. The aqueous acidic solution according to claim 2, wherein the anionic polyether is a copolymer selected from the group consisting of an ethyleneoxide, a propyleneoxide, and any mixture thereof.

6. The aqueous acidic solution according to claim 2, wherein the linear and branched alkylene oxide copolymers comprise comonomer units in a statistical, alternating or blocklike distribution.

7. The aqueous acidic solution according to claim 2, wherein the branched alkylene oxide copolymers are prepared by a process comprising:

copolymerizing at least 2 different alkylene oxides using at least one polyol comprising at least 3 hydroxy groups as a starter molecule; and

converting one hydroxy end group of at least one branch into an anionic group.

8. The aqueous acidic solution according to claim 7, wherein the at least one polyol is an aliphatic, a cycloaliphatic, or an aromatic polyol,

an aliphatic, a cycloaliphatic, or an aromatic oligomer, or

an aliphatic, a cycloaliphatic, or an aromatic polymer.

9. The aqueous acidic solution according to claim 1, comprising, based on a complete weight of the solution, 1 ppm to 0.1% by weight of the polymeric surface active anionic polyether.

10. The aqueous acidic solution according to claim 1, comprising, based on a complete weight of the solution, 0.5 to 50% by weight of the hydrofluoric acid.

11. The aqueous acidic solution according to claim 1, comprising, based on a complete weight of the solution, 3 to 15% by weight of the nitric acid.

12. The aqueous acidic solution according to claim 1, further comprising an acid different from the hydrofluoric and the nitric acid.

13. The aqueous acidic solution according to claim 12, wherein the acid is selected from the group consisting of an acetic acid, a sulfuric acid, a phosphoric acid and a hexafluorosilicic acid.

14. A structure comprising the aqueous acidic solution according to claim 1,

wherein the structure is debonding areas in manufacturing devices generating electricity upon exposure to electromagnetic radiation in a single filed etching process,

rough surfaces in wafer bonding processes,

a bactericidal structure, or

an anti-adhesive structure.

15. A method of texturizing surface of single crystal and polycrystal silicon substrates, the method comprising:

(i) contacting at least one major surface of a single crystal or polycrystal silicon substrate with the aqueous acidic etching solution according to claim **1**;

(ii) etching the at least one major surface of the single crystal or polycrystal silicon substrate for a time and at a temperature sufficient to obtain a surface texturization comprising recesses and protrusions; and

(iii) separating the at least one major surface of the single crystal or polycrystal silicon substrate from the aqueous acidic etching solution.

16. The method according to claim **15**, wherein two opposite major surfaces of the single crystal or polycrystal silicon substrate are contacted with the aqueous acidic etching solution in said contacting (i).

17. The method according to claim **16**, wherein the single crystal or polycrystal silicon substrate is dipped entirely into the aqueous acidic etching solution in said contacting (i).

18. The method according to claim **15**, wherein the at least one major surface of the single crystal or polycrystal silicon substrate is etched for 1 to 10 minutes at a temperature of from 0 to 50° C. in said etching (ii).

19. The method according to claim **15**, wherein the surface texturization obtained in said etching (ii) comprising a multitude of pits having a depth in a range of from 0.1 to 15 μm and a diameter in a range of from 0.1 to 15 μm.

20. The method according to claim **19**, wherein the pits are closed to more than 180°.

21. The method according to claim **19**, wherein a depth of the pits is larger than a width of the pits in at least one direction.

22. The method according to claim **19**, wherein the pits are elongated depressions.

23. The method according to claim **15**, wherein the single crystal or polycrystal silicon substrate is entirely removed from the aqueous acidic etching solution in said separating (iii).

24. A method of manufacturing devices generating electricity upon exposure to electromagnetic radiation, the method comprising texturizing the surface of single crystal and polycrystal silicon substrates according to the method of claim **15**.

25. The method of claim **24**, wherein the electromagnetic radiation is solar light.

26. The method of claim **25**, wherein the devices are photovoltaic cells or solar cells.

27. A device comprising the aqueous acidic etching solution according to claim **1**, wherein the device is an electrical, a mechanical, or an optical device.

28. A device generating electricity upon exposure to electromagnetic radiation comprising at least one polymeric surface active anionic polyether.

29. The aqueous acidic solution according to claim **1**, comprising, based on a complete weight of the solution:

2 to 50% by weight of the hydrofluoric acid;

0.5 to 50% by weight of the nitric acid; and

1 ppm to 0.1% by weight of the polymeric surface active anionic polyether.

30. The aqueous acidic solution according to claim **1**, wherein the polymeric surface active anionic polyether is selected from water soluble and water dispersible linear and branched alkylene oxide copolymers, and mixtures thereof.

31. The aqueous acidic solution according to claim **30**, wherein the average degree of polymerization of the linear alkylene oxide copolymers is in the range of 5 to 200, and the average degree of polymerization of the branches of the branched alkylene oxide copolymers is in the range of from 5 to 50.