CLAIM(S):

What is claimed is:

1. A method for manufacturing a chemical mechanical polishing composition, the method comprising:

(a) providing a liquid solution;

(b) adding a silica producing compound and an aminosilane compound into the liquid solution, thereby causing colloidal silica particles to grow such that a dispersion is obtained including colloidal silica particles having the aminosilane compound incorporated therein; and

(c) processing the dispersion to obtain a chemical mechanical polishing composition including colloidal silica particles having the aminosilane compound incorporated therein, the processing including adjusting a pH of the dispersion to a value in a range from about 1.5 to about 7 and diluting the dispersion such that the colloidal silica particles make up less than 20 percent by weight of the polishing composition.

2. The method of claim 1, wherein:

the liquid solution provided in (a) comprises an alkali catalyst and has a pH in a range from about 9 to about 12; and

the silica producing compound comprises tetramethyl orthosilicate, tetraethyl orthosilicate, silicic acid, an alkali silicate, or a silicon tetrahalide.

3. The method of claim 2, wherein the alkali catalyst has from 1 to 6 carbon atoms.

4. The method of claim 2, wherein the alkali catalyst is tetramethylammonium hydroxide or ethyloxypropylamine.

5. The method of claim 1, wherein:

(a) further comprises providing a high pH silicate solution; and

(b) further comprises (i) processing the silicate solution to form silicic acid thereby causing colloidal silica particles to grow in a reaction vessel and (ii) adding an aminosilane compound to the reaction vessel such that it becomes incorporated into the colloidal silica particles growing in (i).

6. The method of claim 5, wherein:

the silicate solution has a pH in a range from about 11 to about 13; and

the processing in (b)(i) comprises passing the silicate solution through an ion exchanged column into the reaction vessel such that the pH is reduced to a value in a range from about 2 to about 5.

7. The method of claim 1, wherein a molar ratio of the aminosilane compound to the silica producing compound in (b) is less than 10 percent.

8. The method of claim 7, wherein the molar ratio is less than 5 percent.

9. The method of claim 1, wherein the aminosilane compound comprises a propyl group, primary amine, or quaternary amine.

10. The method of claim 1, wherein the aminosilane compound comprises bis(2-hydroxyethyl)-3-aminopropyl trialkoxysilane, diethylaminomethyltrialkoxysilane, (N,N-diethyl-3-aminopropyl)trialkoxysilane), 3-(N-styrylmethyl-2-aminoethylaminopropyl trialkoxysilane, aminopropyl trialkoxysilane, (2-N-benzylaminoethyl)-3-aminopropyl trialkoxysilane), trialkoxysilyl propyl-N,N,N-trimethyl ammonium, N-(trialkoxysilylethyl)benzyl-N,N,N-trimethyl ammonium, (bis(methyldialkoxysilylpropyl)-N-methyl amine, bis(trialkoxysilylpropyl)urea, bis(3-(trialkoxysilyl)propyl)-ethylenediamine, bis(trialkoxysilylpropyl)amine, bis(trialkoxysilylpropyl)amine, 3-

aminopropyltrialkoxysilane, N-(2-Aminoethyl)-3-aminopropylmethyldialkoxysilane, N-(2-aminoethyl)-3-aminopropyltrialkoxysilane, 3-aminopropylmethyldialkoxysilane, 3-aminopropyltrialkoxysilane, (N-trialkoxysilylpropyl)polyethyleneimine, trialkoxysilylpropyldiethylenetriamine, N-phenyl-3-aminopropyltrialkoxysilane, N-(vinylbenzyl)-2-aminoethyl-3-aminopropyltrialkoxysilane, 4-aminobutyltrialkoxysilane, or a mixture thereof.

11. The method of claim 1, wherein the processing in (c) comprises diluting the dispersion with water to such that the chemical mechanical polishing composition comprise about 15 weight percent or less of the colloidal silica.

12. The method of claim 1, wherein the processing in (c) comprises adjusting the pH of the dispersion to a value in a range from about 3.5 to about 6.

13. The method of claim 12, wherein the pH is adjusted using a buffering agent having a pKa in a range from about 3.5 to about 5.5.

14. The method of claim 1, wherein the liquid solution comprises colloidal silica particles suspended therein such that the colloidal silica particles grown in (b) comprise a core-shell structure in which an outer shell is disposed over an inner core, the aminosilane compound being incorporated in the outer shell.

15. The method of claim 1, wherein:

the liquid solution comprises colloidal silica particles suspended therein such that the colloidal silica particles grown in (b) comprise a core-shell structure in which an outer shell is disposed over an inner core, the aminosilane compound being incorporated in the outer shell;

the aminosilane compound comprises a propyl group; and

the processing in (c) comprises (i) adjusting the pH of the dispersion to a value in a range from about 3.5 to about 6 using a buffering agent having a pKa in a range from about 3.5 to about 5.5 and (ii) diluting the dispersion with water such that the chemical mechanical polishing composition comprises about 15 weight percent or less of the colloidal silica.

16. A method for manufacturing a chemical mechanical polishing composition, the method comprising the following processing steps in sequence:

(a) providing a dispersion including colloidal silica abrasive particles dispersed in a liquid carrier;

(b) admixing an aminosilane compound to the dispersion such that the aminosilane associates with the colloidal silica particles;

(c) adding a silica producing compound to the dispersion thereby causing further growth of the colloidal silica abrasive particles such that the aminosilane compound becomes incorporated in the particles to obtain a modified dispersion; and

(d) processing the modified dispersion to obtain the chemical mechanical polishing composition.

17. The method of claim 16, wherein (c) further comprises (i) adding the silica producing compound to the dispersion and (ii) heating the dispersion thereby causing the further growth of the colloidal silica abrasive particles such that the aminosilane becomes incorporated therein.

18. The method of claim 16, wherein the silica producing compound comprises tetramethyl orthosilicate, tetraethyl orthosilicate, silicic acid, an alkali or ammonium silicate, or a silicon tetrahalide.

19. The method of claim 16, wherein the processing in (d) comprises adjusting a pH of the modified dispersion to a value in a range from about 1.5 to about 7 and diluting

the modified dispersion such that the colloidal silica particles make up less than 20 percent by weight of the polishing composition.

20. The method of claim 16, wherein:

the aminosilane compound comprises a propyl group; and

the processing in (d) comprises (i) adjusting the pH of the modified dispersion to a value in a range from about 3.5 to about 6 using a buffering agent having a pKa in a range from about 3.5 to about 5.5 and (ii) diluting the modified dispersion with water such that the chemical mechanical polishing composition comprises about 15 weight percent or less of the colloidal silica.