CLAIMS:

1. A chemical-mechanical polishing composition comprising:

(a) an abrasive comprising negatively charged colloidal silica particles and alumina particles, wherein the alumina particles are surface-coated with an anionic polymer, wherein the polishing composition has a pH of 3 to 3.5~~about 2 to about 5~~, and

(b) water,

wherein the polishing composition further comprises an oxidizing agent.

2. The polishing composition of claim 1, wherein the silica particles comprise colloidal silica particles, aluminum-doped silica particles, sulfonate modified colloidal silica or a combination thereof.

3. The polishing composition of claim 1, wherein the anionic polymer comprises repeating monomeric units selected from carboxylic acid monomeric units, sulfonic acid monomeric units, phosphonic acid monomeric units, and combinations thereof.

4. The polishing composition of claim 3, wherein the anionic polymer comprises repeating monomeric units selected from acrylic acid, methacrylic acid, itaconic acid, maleic acid, succinic acid, terephthalic acid, aspartic acid, maleic anhydride, 4-vinylbenzenesulfonic acid, vinyl sulfonic acid, 2-sulfoethyl acrylate, 2-sulfoethyl methacrylate, 3-sulfopropyl acrylate, 3-sulfopropyl methacrylate, 2-propene-1-sulfonic acid, styrene sulfonic acid, 2-acrylamido-2-methyl-1-propane sulfonic acid, vinylidene-1,1-diphosphonic acid, dimethyl-*p*-vinylbenzylphosphonate, ammonium *bis*diethylphosphonate (meth)acrylate, acrylamide phosphonate monomers, vinylphosphonic acid, 2-(methacroyloxy)ethylphosphate, and combinations thereof.

5. The polishing composition of claim 1, wherein the anionic polymer comprises a copolymer comprising a combination of sulfonic acid monomeric units and carboxylic acid monomeric units, or a copolymer comprising a combination of sulfonic acid monomeric units and phosphonic acid monomeric units.

6. The polishing composition of claim 5, wherein the anionic polymer consists of 2-acrylamido-2-methylpropane sulfonic acid monomeric units and acrylic acid monomeric units.

7. The polishing composition of claim 1, wherein the anionic polymer consists of 2-acrylamido-2-methylpropane sulfonic acid monomeric units.

~~8. The polishing composition of claim 1, wherein the polishing composition further comprises an oxidizing agent.~~

8~~9~~. The polishing composition of claim 1~~8~~, wherein the oxidizing agent comprises ferric ion.

9~~10~~. The polishing composition of claim 8~~9~~, wherein the oxidizing agent further comprises hydrogen peroxide.

10~~11~~. The polishing composition of claim 1, wherein the polishing composition further comprises a corrosion inhibitor.

11~~12~~. The polishing composition of claim 10~~11~~, wherein the corrosion inhibitor is glycine, lysine, arginine, alanine, or combinations thereof.

12~~13~~. The polishing composition of claim 11~~12~~, wherein the corrosion inhibitor is glycine.

13~~14~~. The polishing composition of claim 1, wherein the polishing composition further comprises a stabilizer.

14~~15~~. The polishing composition of claim 13~~14~~, wherein the stabilizer is selected from acetic acid, phthalic acid, citric acid, adipic acid, oxalic acid, malonic acid, aspartic acid, succinic acid, glutaric acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, maleic acid, glutaconic acid, muconic acid, ethylenediaminetetraacetic acid (EDTA), propylenediaminetetraacetic acid (PDTA), and combinations thereof.

15~~16~~. The polishing composition of claim 14~~15~~, wherein the stabilizer is malonic acid.

16~~17~~. The polishing composition of claim 1, wherein the polishing composition further comprises an organic phosphonic acid.

1718. The polishing composition of claim 1617, wherein the organic phosphonic acid is selected from 2-aminoethylphosphonic acid, 1-hydroxyethylidene-1,1-diphosphonic acid, aminotri(methylenephosphonic acid), ethylenediaminetetra(methylenephosphonic acid), diethylenetriaminepenta(methylenephosphonic acid), ethane-1,1-diphosphonic acid, ethane-1,1,2-triphosphonic acid, ethane-1-hydroxy-1,1-diphosphonic acid, ethane-1-hydroxy-1,1,2-triphosphonic acid, ethane-1,2-dicarboxy-1,2-diphosphonic acid, methanehydroxyphosphonic acid, 2-phosphonobutane-1,2-dicarboxylic acid, 1-phosphonobutane-2,3,4-tricarboxylic acid, α-methyl phosphonosuccinic acid, and combinations thereof.

~~19. The polishing composition of claim 1, wherein the polishing composition has a pH of about 3 to about 3.5.~~

1820. The polishing composition of claim 1, wherein the polishing composition further comprises an additive selected from a biocide, a buffer, a surfactant, a catalyst, a stabilizer, a corrosion inhibitor, and combinations thereof.

1921. A method of chemically mechanically polishing a substrate comprising:

(i) providing a substrate,

(ii) providing a polishing pad,

(iii) providing a chemical-mechanical polishing composition comprising:

(a) an abrasive comprising silica particles and alumina particles, wherein the alumina particles are surface-coated with an anionic polymer, wherein the polishing composition has a pH of 3 to 3.5 and further comprises an oxidizing agent, and

(b) water,

(iv) contacting the substrate with the polishing pad and the chemical-mechanical polishing composition, and

(v) moving the polishing pad and the chemical mechanical polishing composition relative to the substrate to abrade at least a portion of the substrate to polish the substrate.

2022. The method of claim 1921, wherein the anionic polymer comprises repeating monomeric units selected from carboxylic acid monomeric units, sulfonic acid monomeric units, phosphonic acid monomeric units, and combinations thereof.

21~~23~~. The method of claim 20~~22~~, wherein the anionic polymer comprises repeating monomeric units selected from acrylic acid, methacrylic acid, itaconic acid, maleic acid, succinic acid, terephthalic acid, aspartic acid, maleic anhydride, 4-vinylbenzenesulfonic acid, vinyl sulfonic acid, 2-sulfoethyl acrylate, 2-sulfoethyl methacrylate, 3-sulfopropyl acrylate, 3-sulfopropyl methacrylate, 2-propene-1-sulfonic acid, styrene sulfonic acid, 2-acrylamido-2-methyl-1-propane sulfonic acid, vinylidene-1,1-diphosphonic acid, dimethyl-*p*-vinylbenzylphosphonate, ammonium *bis*diethylphosphonate (meth)acrylate, acrylamide phosphonate monomers, vinylphosphonic acid, 2-(methacroyloxy)ethylphosphate, and combinations thereof.

22~~24~~. The method of claim 19~~21~~, wherein the anionic polymer comprises a copolymer comprising a combination of sulfonic acid monomeric units and carboxylic acid monomeric units, or comprises a copolymer comprising a combination of sulfonic acid monomeric units and phosphonic acid monomeric units.

23~~25~~. The method of claim 22~~24~~, wherein the anionic polymer consists of 2-acrylamido-2-methylpropane sulfonic acid monomeric units and acrylic acid monomeric units.

24~~26~~. The method of claim 19~~21~~, wherein the anionic polymer consists of 2-acrylamido-2-methylpropane sulfonic acid monomeric units.

25~~27~~. The method of claim 19~~21~~, wherein the polishing composition further comprises ~~an oxidizing agent,~~ a corrosion inhibitor, a stabilizer, an organic phosphonic acid, or any combination thereof.

26~~28~~. The method of claim 19~~21~~, wherein the substrate comprises a silicon oxide layer on a surface of the substrate, wherein at least a portion of the silicon oxide layer is abraded to polish the substrate.

27~~29~~. The method of claim 19~~21~~, wherein the substrate comprises a nitride layer on a surface of the substrate, wherein at least a portion of the nitride layer is abraded to polish the substrate.