We claim:

1. A method for polishing a silicon wafer, comprising:

providing a silicon wafer, having a surface;

providing a chemical mechanical polishing pad, wherein the chemical mechanical polishing pad comprises a polishing layer which is the reaction product of raw material ingredients, comprising:

a polyfunctional isocyanate; and,

a curative package, comprising:

at least 5 wt% of an amine initiated polyol curative, wherein the amine initiated polyol curative contains at least one nitrogen atom per molecule; wherein the amine initiated polyol curative has an average of at least three hydroxyl groups per molecule;

25 to 95 wt% of a high molecular weight polyol curative, wherein the high molecular weight polyol curative has a number average molecular weight, M_N, of 2,500 to 100,000; and wherein the high molecular weight polyol curative has an average of 3 to 10 hydroxyl groups per molecule; and,

0 to 70 wt% of a difunctional curative;

wherein the polishing layer exhibits a density of greater than 0.4 g/cm^3; a Shore D hardness of 5 to 40; an elongation to break of 100 to 450%; and, a cut rate of 25 to 150 μm/hr; and, wherein the polishing layer has a polishing surface adapted for polishing the silicon wafer; and,

creating dynamic contact between the polishing surface of the polishing layer and the surface of the silicon wafer, wherein the surface of the silicon wafer is polished.

2. The method of claim 1, wherein the surface of the silicon wafer is a front surface; and, wherein the front surface of the silicon wafer is haze free polished to a haze of < 0.075 ppm.

3. The method of claim 2, wherein the stoichiometric ratio of the reactive hydrogen groups in the curative package to the unreacted isocyanate groups in the polyfunctional isocyanate is 0.85 to 1.15.

4. The method of claim 2, wherein the polyfunctional isocyanate is selected from the group consisting of an aliphatic polyfunctional isocyanate, an aromatic polyfunctional isocyanate and a mixture thereof.

5. The method of claim 4, wherein the difunctional curative is selected from the group consisting of diol curatives and diamine curatives.

6. The method of claim 4, wherein the polyfunctional isocyanate is an isocyanate-terminated urethane prepolymer having 2 to 12 wt% unreacted NCO groups.

7. The method of claim 6, wherein the curative package, comprises:

5 to 20 wt% of the amine initiated polyol curative, wherein the amine initiated polyol curative contains two nitrogen atom per molecule; wherein the amine initiated polyol curative has an average of 4 hydroxyl groups per molecule; and, wherein the amine initiated polyol curative has a number average molecular weight, M_N, of 200 to 400;

50 to 75 wt% of the high molecular weight polyol curative, wherein the high molecular weight polyol curative has a number average molecular weight, M_N, of 10,000 to 12,000; and, wherein the high molecular weight polyol curative has an average of 6 hydroxyl groups per molecule;

10 to 30 wt% of the difunctional curative; wherein the difunctional curative is a diamine curative selected from the group consisting of 4,4'-methylene-bis-(2-chloroaniline) (MBOCA); 4,4'-methylene-bis-(3-chloro-2,6-diethylaniline) (MCDEA); and, isomers thereof;

wherein the stoichiometric ratio of the reactive hydrogen groups in the curative package to the unreacted isocyanate groups in the polyfunctional isocyanate is 0.95 to 1.05;

wherein the polishing layer exhibits a density of 0.65 to 0.85 g/cm^3; a Shore D hardness of 10 to 40; an elongation to break of 150 and 350%; and, a cut rate of 30 to 60 μm/hr.

8. The method of claim 7, wherein the isocyanate-terminated urethane prepolymer has 5 to 7 wt% unreacted NCO groups; and, wherein the isocyanate-terminated urethane prepolymer exhibits a number average molecular weight, M_N, of 400 to 2,500.

9. The method of claim 8, wherein the polishing layer has a spiral groove pattern formed therein.

10. The method of claim 9, wherein the circumference fraction grooved remains within 10% of its average value as a function of a radius of the polishing layer in an area extending from an outer perimeter of the polishing surface a majority distance to a center of the polishing surface.

We Claim:

1. A method for polishing a silicon wafer, comprising:

providing a silicon wafer, having a surface;

providing a chemical mechanical polishing pad, wherein the chemical mechanical polishing pad comprises a polishing layer which is the reaction product of raw material ingredients, comprising:

a polyfunctional isocyanate; and,

a curative package, comprising:

at least 5 wt% of an amine initiated polyol curative, wherein the amine initiated polyol curative contains at least one nitrogen atom per molecule; wherein the amine initiated polyol curative has an average of at least three hydroxyl groups per molecule;

25 to 95 wt% of a high molecular weight polyol curative, wherein the high molecular weight polyol curative has a number average molecular weight, M_N, of 7,500 to 25,000; and wherein the high molecular weight polyol curative has an average of 3 to 10 hydroxyl groups per molecule; and,

0 to 70 wt% of a difunctional curative; wherein the difunctional curative is selected from the group consisting of diol curatives and diamine curatives;

wherein the polishing layer exhibits a density of greater than 0.4 g/cm^3; a Shore D hardness of 5 to 40; an elongation to break of 100 to 450%; and, a cut rate of 25 to 150 μm/hr; and, wherein the polishing layer has a polishing surface adapted for polishing the silicon wafer; and,

creating dynamic contact between the polishing surface of the polishing layer and the surface of the silicon wafer, wherein the surface of the silicon wafer is polished.

2. The method of claim 1, wherein the surface of the silicon wafer is a front surface; and, wherein the front surface of the silicon wafer is haze free polished to a haze of < 0.075 ppm.

3. The method of claim 2, wherein the stoichiometric ratio of the reactive hydrogen groups in the curative package to the unreacted isocyanate groups in the polyfunctional isocyanate is 0.85 to 1.15.

4. The method of claim 2, wherein the polyfunctional isocyanate is selected from the group consisting of an aliphatic polyfunctional isocyanate, an aromatic polyfunctional isocyanate and a mixture thereof.

5. The method of claim 4, wherein the difunctional curative is selected from the group consisting of diol curatives and diamine curatives.

6. The method of claim 4, wherein the polyfunctional isocyanate is an isocyanate-terminated urethane prepolymer having 2 to 12 wt% unreacted NCO groups.

7. The method of claim 6, wherein the curative package, comprises:

5 to 20 wt% of the amine initiated polyol curative, wherein the amine initiated polyol curative contains two nitrogen atom per molecule; wherein the amine initiated polyol curative has an average of 4 hydroxyl groups per molecule; and, wherein the amine initiated polyol curative has a number average molecular weight, M_N, of 200 to 400;

50 to 75 wt% of the high molecular weight polyol curative, wherein the high molecular weight polyol curative has a number average molecular weight, M_N, of 10,000 to 12,000; and, wherein the high molecular weight polyol curative has an average of 6 hydroxyl groups per molecule;

10 to 30 wt% of the difunctional curative; wherein the difunctional curative is a diamine curative selected from the group consisting of 4,4'-methylene-bis-(2-chloroaniline) (MBOCA); 4,4'-methylene-bis-(3-chloro-2,6-diethylaniline) (MCDEA); and, isomers thereof;

wherein the stoichiometric ratio of the reactive hydrogen groups in the curative package to the unreacted isocyanate groups in the polyfunctional isocyanate is 0.95 to 1.05;

wherein the polishing layer exhibits a density of 0.65 to 0.85 g/cm^3; a Shore D hardness of 10 to 40; an elongation to break of 150 and 350%; and, a cut rate of 30 to 60 μm/hr.

8. The method of claim 7, wherein the isocyanate-terminated urethane prepolymer has 5 to 7 wt% unreacted NCO groups; and, wherein the isocyanate-terminated urethane prepolymer exhibits a number average molecular weight, M_N, of 400 to 2,500.

9. The method of claim 8, wherein the polishing layer has a spiral groove pattern formed therein.

10. The method of claim 9, wherein the circumference fraction grooved remains within 10% of its average value as a function of a radius of the polishing layer in an area extending from an outer perimeter of the polishing surface a majority distance to a center of the polishing surface.