Claims

~~1. A method for making a solution for use in preparing a surface of a substrate, the solution comprising:~~

~~providing a continuous medium;~~

~~adding a polymer material to the continuous medium; and~~

~~adding a fatty acid to the continuous medium having the polymer material, the polymer material defining a physical network that exerts forces in the solution that overcome buoyancy forces experienced by the fatty acid, thus preventing the fatty acids from moving within the solution until a yield stress of the polymer material is exceeded by an applied agitation, the applied agitation being for transporting the solution from a container to a preparation station that applies the solution to the surface of the substrate.~~

~~2. The method of claim 1, wherein the continuous medium is one of de-ionized (DI) water, a hydrocarbon, a base fluid, a hydrofluoric acid (HF) solution, an ammonia based solution, or mixtures of DI water and chemicals.~~

~~3. The method of claim 1, wherein the polymer material is one of Carbapol, Stabileze, Rheovis ATA and Rheovis ATN, Poly (acrylic acid), Carageenan, Methylcellulose, Hydroxypropylmethylcellulose, Hydroxyethylcellulose, Gum Arabic (Acacia), Gum Tragacanth, Polyacrylates, or Carbomer.~~

~~4. The method of claim 1, wherein the fatty acid is defined by one of lauric acid, palmitic acid, stearic acid, oleic acid, linoleic acid, linolenic acid, arachidonic acid, gadoleic acid, eurcic acid, butyric acid, caproic acid, caprylic acid, myristic acid, margaric acid, behenic acid, lignoseric acid, myristoleic acid, palmitoleic acid, nervanic acid, parinaric acid, timnodonic acid, brassic acid, clupanodonic acid, lignoceric acid, or cerotic acid.~~

~~5. The method of claim 1, wherein the fatty acid is stearic acid, the continuous medium is de-ionized water, and the polymer material is a poly(acrylic acid).~~

~~6. The method of claim 5, further comprising:~~

~~(i) mixing the poly(acrylic acid) with the continuous medium at high revolutions per minute (RPM) ranging between about 5 RPMs and about 1,500 RPMs;~~

~~(ii) heating the solution to about 75 degrees C and add a surfactant;~~

~~(iii) adding a neutralizing basic component;~~

~~(iv) mixing the solution when the stearic acid is added so that the stearic acid has substantially melted in the solution;~~

~~(v) adding a chelating agent while the solution is at about 75 degrees C; and~~

~~(vi) cooling the solution to allow ripening.~~

~~7. The method of claim 1, wherein the fatty acid is selected from the group consisting of stearic acid ($CH_3(CH_2)_{16}COOH$), palmitic acid, and oleic acid.~~

1~~8~~. A method for using a solution for cleaning a substrate, comprising:

providing a solution in a container, the solution being mixed from at least a continuous medium, a polymer material, and a solid material, the polymer material in the solution imparting a finite yield stress to the ~~material~~ solution, such that the solution is maintained in a stable elastic gel form, the stable elastic gel form being configured to hold the solid material ~~from~~ in place and prevent the solid material from moving in the solution and forming sedimentation if stresses less than the finite yield stress is imparted on the solution after synthesis of the solution and during any storage of the solution;

applying at least a minimum shear stress on the solution, the minimum shear stress being at least greater than the finite yield stress so that the stable elastic gel exhibits fluid-like behavior;

flowing the solution from the container after imparting the minimum shear stress, the solution that is flown from the container has a mixed consistency of the solid material in the solution; and

applying the solution to a preparation system for application to a surface of the substrate.

2~~9~~. ~~A~~ The method for using a solution for cleaning a substrate as recited in claim ~~8~~ 1, wherein the solid material is a fatty acid defined by one of lauric acid, palmitic acid, stearic acid, oleic acid, linoleic acid, linolenic acid, arachidonic acid, gadoleic acid, eurcic acid, butyric acid, caproic acid, caprylic acid, myristic acid, margaric acid, behenic acid, lignoseric acid, myristoleic acid, palmitoleic acid, nervanic acid, parinaric acid, timnodonic acid, brassic acid, clupanodonic acid, lignoceric acid, or cerotic acid.

3~~10~~. ~~A~~ The method for using ~~a~~ the solution for cleaning ~~a~~ the substrate as recited in claim ~~8~~ 1, wherein the continuous medium is one of de-ionized (DI) water, a hydrocarbon, a base fluid, a hydrofluoric acid (HF) solution, an ammonia based solution, or mixtures of DI water and chemicals.

4~~11~~. ~~A~~ The method for using ~~a~~ the solution for cleaning ~~a~~ the substrate as recited in claim ~~8~~ 1, wherein the polymer material is one of Poly (acrylic acid), ~~Carbapol, Stabileze, Rheovis ATA and Rheovis ATN,~~ Carageenan, Methylcellulose, Hydroxypropylmethylcellulose, Hydroxyethylcellulose, Gum Arabic (Acacia), Gum Tragacanth, Polyacrylates, or Carbomer.

5~~12~~. ~~A~~ The method for using ~~a~~ the solution for cleaning ~~a~~ the substrate as recited in claim ~~8~~ 1, wherein applying at least a minimum shear stress on the solution is imparted through pumping the solution from the container, the pumping providing agitation that exceeds the finite yield stress causing the solution to flow.

6~~13~~. ~~A~~ The method for using ~~a~~ the solution for cleaning ~~a~~ the substrate as recited in claim ~~8~~ 1, wherein flowing the solution is from the container to the preparation system.

7~~14~~. ~~A~~ The method for using ~~a~~ the solution for cleaning ~~a~~ the substrate as recited in claim ~~13~~ 6, wherein the preparation system is a proximity head system, the proximity head system applies the solution in the form of a meniscus between a surface of the proximity head and a surface of the substrate.

8~~15~~. ~~A~~ The method for using ~~a~~ the solution for cleaning ~~a~~ the substrate as recited in claim ~~14~~ 7, wherein the proximity head system includes a first head for processing a first surface and a second head for processing a second surface.

~~16. A substrate cleaning system, comprising:~~

~~a proximity head system for applying a meniscus to a surface of a substrate during a cleaning operation, the meniscus being defined by a solution;~~

~~a container holding the solution, the solution being mixed from at least a continuous medium, a polymer material, and a solid material, the polymer material in the solution imparting a finite yield stress to the material, such that the solution is maintained in a stable elastic gel form, the stable elastic gel form being configured to hold the solid material form in place and prevent the solid material from moving in the solution if stresses less than the finite yield stress is imparted on the solid material after synthesis of the solution and during any storage of the solution;~~

~~a pump for moving the solution from the container to the proximity head system, the pump applies at least a minimum shear stress on the solution, and the pump provides agitation that exceeds the finite yield stress causing the solution to flow;~~

~~a head of the proximity head system receiving the solution that is configured to be applied to the surface of the substrate in the form of the meniscus.~~

~~17. A substrate cleaning system as recited in claim 16, wherein the meniscus is in a fluid form or a foam form.~~

~~18. A substrate cleaning system as recited in claim 16, further comprising,~~

~~a foam generation system that transforms the solution into tri-state bodies, the tri-state bodies being defined by a part fluid, a part gas, and a part solids.~~

~~19. A substrate cleaning system, comprising:~~

~~a jet application system for applying a solution to a surface of a substrate during a cleaning operation;~~

~~a container holding the solution, the solution being mixed from at least a continuous medium, a polymer material, and solid material, the polymer material in the solution imparting a finite yield stress to the material, such that the solution is maintained in a stable elastic gel form, the stable elastic gel form being configured to hold the solid material form in place and prevent the solid material from moving in the solution if stresses less than the finite yield stress is imparted on the solid material after synthesis of the solution and during any storage of the solution; and~~

~~a pump for moving the solution from the container to the jet application system, the pump applies at least a minimum shear stress on the solution, and the pump provides agitation that exceeds the finite yield stress causing the solution to flow;~~

~~wherein the jet sprays the solution to the surface of the substrate so as to remove unwanted contaminants.~~

~~20. A substrate cleaning system 19, wherein the jet applies a stream of the solution on the surface of the substrate.~~

9. The method for using the solution for cleaning the substrate as recited in claim 2, wherein the solid material has a concentration that exceeds a solubility limit within the continuous medium.

10. The method for using the solution for cleaning the substrate as recited in claim 1, further comprising:

(i) mixing the polymer material with the continuous medium at between about 50 revolutions per minute (RPM) up to about 1,500 RPMs;

(ii) heating the solution to about 75 degrees C and adding a surfactant;

(iii) adding a neutralizing basic component;

(iv) mixing the solution when the solid material is added so that the solid material has substantially melted in the solution;

(v) adding a chelating agent while the solution is at about 75 degrees C; and

(vi) cooling the solution to allow ripening.

11. The method for using the solution for cleaning the substrate as recited in claim 1, wherein the solid material nucleates to form larger sized solid material in the solution.

12. A method for using a solution for cleaning a substrate, comprising:

providing a solution in a container, the solution being mixed from at least a continuous medium, a polymer material, and a solid material, the polymer material in the solution imparting a finite yield stress to the solution, such that the finite yield stress is greater than a buoyancy force of the solid material and the solution is maintained in a stable elastic gel form, the stable elastic gel form being configured to hold the solid material in place and prevent the solid material from moving in the solution if stresses less than the finite yield stress is imparted on the solution after synthesis of the solution and during any storage of the solution;

applying at least a minimum shear stress on the solution, the minimum shear stress being at least greater than the finite yield stress so that the stable elastic gel exhibits fluid-like behavior;

flowing the solution from the container after imparting the minimum shear stress, the solution that is flown from the container has a mixed consistency of the solid material in the solution; and

applying the solution to a preparation system for application to a surface of the substrate.