CLAIMS

1. A method for cleaning a substrate, comprising method operations of:

disposing a fluid layer having solid components therein to a surface of the substrate;

creating a shear force directed substantially parallel to the surface of the substrate and toward an outer edge of the substrate, the shear force resulting from one of a normal component or a tangential component of a force applied to a solid body in contact with the fluid layer; and

rinsing the surface of the substrate to remove the fluid layer.

2. The method of claim 1, wherein the method operation of creating a shear force directed substantially parallel to the surface of the substrate and toward an outer edge of the substrate includes,

forcing one of the solid components toward the surface of the substrate.

3. The method of claim 1, wherein the method operation of creating a shear force directed substantially parallel to the surface of the substrate and toward an outer edge of the substrate includes,

thinning a portion of the fluid layer defined between a bottom surface of one of the solid components and a top surface of the substrate.

4. The method of claim 1, further comprising:

periodically perturbing the fluid layer causing the shear force to be periodically created.

5. The method of claim 1, wherein the fluid layer includes a fatty acid.

6. The method of claim 5, wherein the fatty acid is carboxylic acid.

7. The method of claim 1, wherein the method operation of creating a shear force directed substantially parallel to the surface of the substrate and toward an outer edge of the substrate includes,

rotating a force transferring entity disposed above the surface of the substrate.

8. The method of claim 1, wherein the method operation of creating a shear force directed substantially parallel to the surface of the substrate and toward an outer edge of the substrate includes,

pressurizing the solid body in contact with the fluid layer.

9. A cleaning apparatus for cleaning a substrate, comprising:

a force transferring entity having an outer surface in contact with a fluid disposed on a surface of the substrate, the fluid having solid components, the force transferring entity configured to force the solid components toward the surface of the substrate; and

a substrate support configured to support the substrate under the force transferring entity.

10. The apparatus of claim 9, wherein the force transferring entity supplies the fluid to the surface of the substrate.

11. The apparatus of claim 9, wherein the force transferring entity is a compliant membrane defining a space therein, the space being filled with the fluid.

12. The apparatus of claim 9, wherein the force transferring entity is configured to rotate around an axis and move laterally relative to the surface of the substrate.

13. The apparatus of claim 9, further comprising:

a fluid delivery system providing the fluid to the force transferring entity and to the surface of the surface of the substrate.

14. The apparatus of claim 9, wherein the fluid includes a fatty acid.

15. The apparatus of claim 9, wherein the fluid includes a surfactant.

16. The apparatus of claim 9 wherein the force applied to the solid components includes a normal component.

17. The apparatus of claim 9, wherein the outer surface of the force transferring entity is textured.

18. The apparatus of claim 9, wherein the outer surface of the force transferring entity includes a plurality of protrusions.

19. The apparatus of claim 9, wherein the outer surface of the force transferring entity is a plate having a planar surface.

20. A substrate cleaning system, comprising:

a fluid reservoir configured to deliver a fluid having solid components to a surface of a substrate;

a force transferring entity having an outer surface configured to contact the fluid disposed on the surface of the substrate, the force transferring entity configured to provide a force having a normal component to thin a fluid layer defined between a bottom surface of one of the solid components and the surface of the substrate; and

a substrate support configured to support the substrate under the force transferring entity.

21. The cleaning system of claim 20, wherein the force transferring entity is configured to be pressurized.

22. The cleaning system of claim 20, wherein the force transferring entity is configured to perturb the fluid layer according to a frequency.

23. The cleaning system of claim 20, wherein the fluid layer is viscoelastic.

24. The cleaning system of claim 20, wherein the support structure is configured to rotate the substrate.

25. The cleaning system of claim 20, wherein the force transferring entity is configured to rotate around an axis and move laterally relative to the surface of the substrate.

26. The cleaning system of claim 20, wherein the force transferring entity is a plate having a planar surface.

27. The cleaning system of claim 20, wherein the force transferring entity is inflatable.

28. The cleaning system of claim 20, further comprising:

a spin rinse and dry system configured to remove the fluid from the surface of the susbstrate.

What is claimed is:

1. A substrate cleaning system, comprising:

a fluid reservoir configured to deliver a fluid having solid components to a surface of a substrate;

a force transferring entity having a compliant membrane disposed over an outer surface, the force transferring entity being one of a bubble or a droplet, the compliant membrane configured to contact the fluid disposed on the surface of the substrate, the force transferring entity configured to provide a force having a normal component to thin a viscoelastic fluid layer defined between a bottom surface of one of the solid components and the surface of the substrate through expansion and contraction of the compliant membrane while contacting the fluid; and

a substrate support configured to support the substrate under the force transferring entity.

2. The cleaning system of claim 1, wherein the force transferring entity is configured to be pressurized to adjust the expansion and contraction of the compliant membrane.

3. The cleaning system of claim 1, wherein the solid components include a crystal that has a triclinic structure.

4. The cleaning system of claim 1, wherein the support structure is configured to rotate the substrate.

5. The cleaning system of claim 1, wherein the force transferring entity is configured to rotate around an axis and move laterally relative to the surface of the substrate.

6. The cleaning system of claim 1, further comprising: a spin rinse and dry system configured to remove the fluid from the surface of the substrate.