ABSTRACT OF THE DISCLOSURE

ORIGINAL

An apparatus can be used to apply and remove fluid substances for processing biological samples. The fluid substances can be delivered between a first substrate and a second substrate. One substrate carries a specimen. A layer of the fluid substance is retained in a gap defined by the first and second substrates. One substrate is moved with respect to the second substrate to disperse the fluid substance in the gap.

CLAIMS

What is claimed is:

1. An automated slide processing station, comprising:

a first platen assembly having a curved portion;

a drive mechanism configured to move the first platen assembly from a standby position to a processing position;

a liquid dispensing assembly for dispensing a liquid; and

a second platen assembly comprising a slide positioning device, said slide positioning device comprising a slide retaining device, the slide positioning device operable to position a slide retained by the slide retaining device proximate to the first platen assembly, the first platen assembly and second platen assembly being configured to cause a longitudinal or transverse rolling movement of the curved portion of the first platen assembly relative to the second platen assembly retained slide to create a varying height gap between the slide and the curved portion sufficient to apply a liquid to a sample on the slide.

2. The automated slide processing station of claim 1, wherein at least one of the first platen assembly and the second platen assembly includes at least one thermal element configured to receive electrical energy and to generate heat using the electrical energy.

3. The automated slide processing station of claim 1, wherein the liquid dispensing assembly includes at least one thermal element configured to receive electrical energy and to generate heat using the electrical energy to heat the liquid.

4. The automated slide processing station of claim 1, further comprising a pressurization device fluidically coupled to a waste port in the curved portion, the pressurization device is adapted to draw the liquid from the varying height gap via the waste port.

5. The automated slide processing station of claim 1, further comprising a waste remover including an inlet spaced apart from the curved portion and the slide, the drive mechanism is configured to move the first platen assembly relative to the second platen assembly to move the liquid toward the inlet using capillary action.

6. The automated slide processing station of claim 1, wherein the liquid dispensing assembly is configured to dispense the liquid from a pipette onto at least one of the slide and the curved portion and/or into the varying height gap.

7. The automated slide processing station of claim 1, wherein the liquid dispensing assembly includes a dispensing unit coupled to the second platen assembly, the dispensing unit has an outlet port positioned to dispense a liquid between the curved portion and the slide held by the slide positioning device.

8. The automated slide processing station of claim 1, wherein the slide retaining device is movable between an open position for receiving the slide and a gripping position for gripping the slide.

9. The automated slide processing station of claim 1, wherein the slide retaining device includes a vacuum chuck for holding the slide.

10. The automated slide processing station of claim 1, wherein the first platen assembly includes a holder and a cover removably coupled to the holder, the cover defines at least a portion of the curved portion.

11. The automated slide processing station of claim 1, wherein the first platen assembly includes a holder and a cover removably coupled to the

holder, the cover has a relatively compliant specimen facing surface for contacting the liquid in the varying height gap, and wherein the holder is relatively rigid.

12. The automated slide processing station of claim 1, wherein the first platen assembly includes a specimen facing surface that comprises a semi-compliant material that is more compliant than the slide.

13. The automated slide processing station of claim 1, wherein the first platen assembly includes a specimen facing surface for contacting the liquid in the varying height gap, the specimen facing surface comprises a rigid material.

14. The automated slide processing station of claim 1, wherein the liquid dispensing assembly includes an outlet port positioned to deliver liquid between the slide and the cover to at least partially fill the varying height gap.

15. The automated slide processing station of claim 1, wherein at least one of the first and second platen assemblies includes a gapping element dimensioned to define the varying height gap between the slide and the curved portion.

16. The automated slide processing station of claim 1, wherein the first platen assembly includes a liquid application region and a plurality of discrete gapping elements positioned outside of the liquid application region and spaced apart from one another along a length of the liquid application region, the plurality of discrete gapping elements are dimensioned to space the slide from the liquid application region to create the varying height gap.

17. The automated slide processing station of claim 1, further comprising a plurality of gapping elements to maintain the varying height gap, and

wherein at least one of the gapping elements has a height of at least about 0.001 inch.

18. The automated slide processing station of claim 1, wherein at least a portion of the curved portion has a radius of curvature of about 15 inches to about 20 inches.

19. The automated slide processing station of claim 1, wherein the drive mechanism is operable move the first platen assembly relatively to the second platen assembly to move the liquid along the varying height gap using capillary action.

20. A method of processing a sample, comprising:

delivering a first slide carrying a first sample to a slide positioning device of an automated slide processing station;

delivering a first liquid to at least one of the first slide and a curved portion of a roller unit of the automated slide processing station; and

rolling the curved portion of the roller unit relative to the first slide held by the slide positioning device to apply the first liquid to the first sample on the first slide while the first liquid is located in a varying height gap defined by the first slide and the curved portion.

21. The method of claim 20, further comprising:

delivering a second liquid to at least one of the first slide and the curved portion of the roller unit after applying the first liquid to the first sample; and

applying the second liquid to the first sample by moving the curved portion relative to the first slide to move the second liquid along the varying height gap.

22. The method of claim 20, further comprising:

moving the first liquid towards a waste port of the roller unit by moving the curved portion relative to the first slide; and

removing the first liquid from the varying height gap using the waste port while at least a portion of the first slide extends across the waste port.

23. The method of claim 20, further comprising rolling the curved portion along the first slide using a gapping element of the curved portion.

24. The method of claim 20, further comprising:

removing the first liquid from between the first slide and the curved portion;

removing a cover from a holder of the roller unit, the cover defining the curved portion; and

placing another cover on the holder of the roller unit before processing a second sample on a second slide.

25. The method of claim 20, further comprising:

delivering a second slide carrying a second sample to the slide positioning device after removing the first slide from the slide positioning device; and

applying a second liquid to the second specimen on the second slide using a surface of the curved portion that contacted the first liquid.

26. The method of claim 20, further comprising:

dispensing a second liquid onto at least one of the curved portion and the first slide after dispensing the first liquid; and

mixing the first liquid and the second liquid using longitudinal or lateral movement of the curved portion relative to the first slide.

27. The method of claim 20, wherein delivering the first liquid comprises dispensing less than about 200 microliters of the first liquid.

28. The method of claim 20, wherein delivering the first liquid comprises dispensing about 50 microliters to about 120 microliters of the first liquid into the varying height gap.

29. The method of claim 20, further comprising:

delivering a second liquid onto at least one of the curved portion and the first slide after delivering the first liquid; and

mixing the first liquid and the second liquid using longitudinal or lateral movement of the curved portion relative to the first slide.

30. The method of claim 20, further comprising:

mixing a first substance and a second substance to produce the first liquid; and

outputting the first liquid from a liquid dispensing assembly to deliver the first liquid to at least one of the first slide and the curved portion.

31. The method of claim 20, further comprising:

heating the first liquid using at least one of the slide positioning device and the roller unit.

32. The method of claim 20, further comprising adjusting a profile of the varying height gap by rolling the curved portion relatively to the first slide to move the first liquid along the varying height gap.

33. The method of claim 20, further comprising:

rolling the curved portion away from the first slide such that the first liquid is delivered between the first slide and a section of the curved portion that has been rolled away from the first slide.

Dated this 16/04/2012

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