evaporation losses, especially at the elevated temperatures that are often necessary. Large volumes of rinse liquid are used to physically displace the large puddles of reagents, which are covered with oil. This rinsing procedure produces large volumes of waste liquid, which may be hazardous waste.

OVERVIEW OF TECHNOLOGY

[0007a] According to a first aspect of the present disclosure, there is provided an automated specimen processing system, comprising: a slide ejector assembly including a slide staging device having a standby platform configured to receive a slide and a slide alignment device configured to engage the slide at a plurality of contact points for moving the slide from a misaligned position to an aligned position on the standby platform; at least one specimen processing station; and a transfer head configured to transport slides from the standby platform to the specimen processing station, the transfer head having a head alignment feature receivable by at least one of a corresponding alignment feature of the slide staging device and/or an alignment feature of the specimen processing station, wherein the head alignment feature includes a first alignment pin and a second alignment pin, the corresponding alignment feature of the slide staging device includes a first opening and a second opening, and the first opening and the second opening are positioned to receive the first alignment pin and the second alignment pin, respectively.

[0007b] According to a second aspect of the present disclosure, there is provided an automated specimen processing system, comprising: a slide staging device including a standby platform configured to receive a microscope slide; and an alignment device having a first aligning member and a second aligning member positioned opposite the first aligning member, wherein the alignment device is configured to engage the microscope slide at a plurality of contact points for moving the slide from a misaligned position to an aligned position; and a transfer head configured to transport microscopes slides from the standby platform to a specimen processing station, the transfer head having a head alignment feature receivable by at least one of a corresponding alignment feature of the slide staging device and/or an alignment feature of the specimen processing station; wherein the head alignment feature includes a first alignment pin and second alignment pin, the corresponding alignment feature of the slide staging device includes a first opening and a second opening, and the first opening and the second opening are positioned to receive the first alignment pin and the second alignment pin, respectively.

[0007c] According to a third aspect of the present disclosure, there is provided a method of transporting specimen-bearing microscope slides in an automated processing system as disclosed herein, comprising: sequentially moving a plurality of specimen-bearing microscope slides from a carrier to a slide staging device; aligning the individual specimen-bearing microscope slides along a longitudinal axis at the slide staging device to an aligned position by engaging the individual specimen-bearing microscope slides at a plurality of contact points; and transporting the individual specimen-bearing microscope slides from the slide staging device to one or more specimen processing stations while in the aligned position.

[0008] At least some embodiments of the technology are directed to automated specimen processing systems capable of processing specimens carried on slides. At least some embodiments include an automated specimen processing system comprising a slide ejector assembly. The slide ejector assembly can include a slide staging device configured to receive a slide. The slide ejector assembly can also include a slide alignment device configured to engage the slide at a plurality of contact points to move the slide from a misaligned position to an aligned position. In one embodiment, the slide alignment device can include a first aligning member and a second aligning member positioned opposite the first aligning member. The first and second aligning members can be movable between an open position for receiving a slide and a closed position for aligning and/or holding the slide.

[0009] The first aligning member, in some embodiments, can include a first contact region and a second contact region for engaging a first edge of the slide. The second aligning member, in some embodiments, can include a third contact region for engaging a second edge of the slide opposite the first edge. In various embodiments, the slide alignment device is configured to engage the slide at three points of contact. In one example, a point of contact can be a small discrete area of the slide contacted by one of the first, second, or third contact regions. In one embodiment, the slide can be moved from the misaligned position to the aligned position on a standby platform by pivoting the slide about a point (e.g., a midpoint) between the three points of contact. In another embodiment, moving the slide from the misaligned position to the aligned position includes aligning a slide longitudinal axis with a standby platform longitudinal axis.

[0010] In some embodiments, an over-travel inhibitor and a slide holding region positioned between the over-travel inhibitor and slide ejector. The over-travel inhibitor can be positioned, for example, to inhibit movement of the slide past the slide holding region. In one

embodiment, the over-travel inhibitor includes a vacuum port positioned to draw a vacuum between a slide and the standby platform as the slide is moved across at least a portion of the

CLAIMS

What is claimed is:

1. An automated specimen processing system, comprising:

a slide ejector assembly including –

a slide staging device having a standby platform configured to receive a slide and a slide alignment device configured to engage the slide at a plurality of contact points for moving the slide from a misaligned position to an aligned position on the standby platform;

at least one specimen processing station; and

a transfer head configured to transport slides from the standby platform to the specimen processing station, the transfer head having a head alignment feature receivable by at least one of a corresponding alignment feature of the slide staging device and/or an alignment feature of the specimen processing station,

wherein the head alignment feature includes a first alignment pin and a second alignment pin, the corresponding alignment feature of the slide staging device includes a first opening and a second opening, and the first opening and the second opening are positioned to receive the first alignment pin and the second alignment pin, respectively.

2. The automated specimen processing system of claim 1, wherein the slide alignment device includes a first aligning member and a second aligning member positioned opposite the first aligning member on the standby platform, and wherein the first and second aligning members are movable between an open position for receiving a slide and a closed position for aligning the slide.

3. The automated specimen processing system of claim 2, wherein the first and second aligning members center the slide relative to a raised slide holding region of the standby platform when the first and second aligning members move from the open position to the closed position.

4. The automated specimen processing system of claim 2, wherein the first aligning member includes a first contact region and a second contact region for engaging a first edge of the slide, and wherein the second aligning member includes a third contact region for engaging a second edge of the slide opposite the first edge.

5. The automated specimen processing system of claim 1, wherein the slide alignment device is configured to engage the slide at three points of contact.

6. The automated specimen processing system of claim 5, wherein the slide staging device is configured such that the slide is moved from the misaligned position to the aligned position on the standby platform by pivoting the slide about a midpoint between the three points of contact.

7. The automated specimen processing system of claim 1, wherein the slide staging device is configured such that the slide is moved from the misaligned position to the aligned position on the standby platform to align a slide longitudinal axis with a standby platform longitudinal axis.

8. The automated specimen processing system of claim 1, wherein the standby platform includes a slide holding region and an over-travel inhibitor, the slide holding region is positioned between the over-travel inhibitor and a slide ejector, and the over-travel inhibitor is positioned to inhibit movement of the slide past the slide holding region.

9. The automated specimen processing system of claim 1, further comprising an over-travel inhibitor that includes a vacuum port positioned to draw a vacuum between a slide and the standby platform as the slide is moved across at least a portion of the standby platform.

10. The automated specimen processing system of claim 9, wherein the over-travel inhibitor includes a sensor for detecting a presence of the slide on the standby platform.

11. The automated specimen processing system of claim 1, further comprising a sensor for detecting a presence of the slide on the standby platform.

~~12. The automated specimen processing system of claim 1, further comprising:~~

~~at least one specimen processing station; and~~

~~a transfer head configured to transport slides from the standby platform to the specimen processing station, the transfer head having a head alignment feature receivable by at least one of a corresponding alignment feature of the slide staging device and/or an alignment feature of the specimen processing station.~~

~~13. The automated specimen processing system of claim 12, wherein the head alignment feature includes a first alignment pin and a second alignment pin, the corresponding alignment feature of the slide staging device includes a first opening and a second opening, and the first opening and the second opening are positioned to receive the first alignment pin and the second alignment pin, respectively.~~

~~14~~12. The automated specimen processing system of claim ~~12~~1, wherein the transfer head includes a capture feature configured to engage the slide and transport the slide in the aligned position.

~~15~~13. The automated specimen processing system of claim ~~14~~12, wherein the capture feature includes a vacuum port positioned to draw a vacuum between an upper surface of the slide and the transfer head as the slide is transported.

~~16~~14. The automated specimen processing system of claim 1, further comprising:

a controller communicatively coupled to the slide ejector assembly, the controller being programmed to –

command the slide alignment device to move a first aligning feature and a second alignment feature to engage the slide at a plurality of contact points to move the slide to the aligned position; and

command the slide alignment device to move the first aligning feature and the second aligning feature to release the slide in the aligned position.

~~17~~15. The automated specimen processing system of claim ~~16~~14, wherein the controller is further programmed to command a transfer head to align with the slide staging device and to transport the slide from the standby platform to a specimen processing station.

~~18~~16. The automated specimen processing system of claim ~~16~~14, wherein the controller is programmed to command the first aligning feature to move in a first direction toward the standby platform and the second aligning feature to move in a second direction opposite the first direction toward the standby platform.

~~19~~17. An automated specimen processing system, comprising:

a slide staging device including –

a standby platform configured to receive a microscope slide; and

an alignment device having a first aligning member and a second aligning member positioned opposite the first aligning member, wherein the alignment device is configured to engage the microscope slide at a plurality of contact points for moving the slide from a misaligned position to an aligned position; and

a transfer head configured to transport microscopes slides from the standby platform to a specimen processing station, the transfer head having a head alignment feature receivable by at least one of a corresponding alignment feature of the slide staging device and/or an alignment feature of the specimen processing station,

wherein the head alignment feature includes a first alignment pin and a second alignment pin, the corresponding alignment feature of the slide staging device includes a first opening and a second opening, and the first opening and the second opening are positioned to receive the first alignment pin and the second alignment pin, respectively.

~~20~~18. The automated specimen processing system of claim ~~19~~17, wherein the first aligning member includes a first contact region and a second contact region for engaging a first edge of the microscope slide, and wherein the second aligning member include a third contact region for engaging a second edge of the microscope slide opposite the first edge.

~~21~~19. A method of transporting specimen-bearing microscope slides in an automated processing system of claim 1 or 17, comprising:

sequentially moving a plurality of specimen-bearing microscope slides from a carrier to a slide staging device;

aligning the individual specimen-bearing microscope slides along a longitudinal axis at the slide staging device to an aligned position by engaging the individual specimen-bearing microscope slides at a plurality of contact points; and

transporting the individual specimen-bearing microscope slides from the slide staging device to one or more specimen processing stations while in the aligned position.

~~22~~20. The method of claim ~~21~~19, further comprising delivering the carrier containing a plurality of specimen-bearing microscope slides to an ejector assembly before sequentially moving the plurality of specimen-bearing microscope slides.

~~23~~21. The method of claim ~~21~~19, wherein sequentially moving the specimen-bearing microscope slides from the carrier to the slide staging device includes pushing the specimen-bearing microscope slides along and onto the slide staging device.

~~24~~22. The method of claim ~~21~~19, wherein transporting the individual specimen-bearing microscope slides includes aligning a transfer head of a transport assembly with the slide staging device and picking up the individual specimen-bearing microscope slides from the slide staging device while maintaining the aligned position.

~~25~~23. The method of claim ~~21~~19, wherein after moving an individual specimen-bearing microscope slide from the carrier to the slide staging device, the method further includes:

drawing a vacuum through an over-travel inhibitor to capture the specimen-bearing microscope slide on a standby platform of the slide staging device; and

detecting the presence of the slide on the standby platform.

~~26~~24. The method of claim ~~21~~19, wherein aligning the individual specimen-bearing microscope slides along a longitudinal axis includes moving first and second aligning members from an open position to a closed position to contact a specimen-bearing microscope slide positioned between the first and second aligning members at three points of contact.

~~27~~25. The method of claim ~~21~~19, further comprising drawing a vacuum between the individual specimen-bearing microscope slides and the slide staging device.

~~28~~26. The method of claim ~~21~~19, further comprising detecting a presence of the individual specimen-bearing microscope slides at the slide staging device.

~~29~~27. The method of claim ~~21~~19, wherein prior to transporting the individual specimen-bearing microscope slides, the method further comprises aligning alignment features of a transport assembly with corresponding alignment features at the slide staging device.

~~30~~28. The method of claim ~~21~~19, wherein transporting the individual specimen-bearing microscope slides includes drawing a vacuum between the individual specimen-bearing slide and a transport assembly configured to transport the specimen-bearing slides to the one or more specimen processing stations while in the aligned position.