CLAIMS

1. An automated system for processing a sample contained in a liquid sample container, the system comprising:

a sample container holder configured for holding a sample container;

an automated tool head configured to rotate about a first axis, and to translate along a second axis different than the first axis;

an analytic element positioner having an analytic element holder configured to releasably grip an analytic element; and

a plurality of sample processing tools carried on the tool head and disposed circumferentially about the tool head at respective positions on the tool head so that the plurality of sample processing tools is rotatable together with the tool head around the first axis and translatable together with the tool head along the second axis, the plurality of tools including

a first capping device configured to controllably grip and release a cap of a sample container held in the sample container holder, and

a specimen transfer device,

wherein the tool head is configured to automatically position the first capping device proximate the sample container cap through one or both of rotation of the tool head about the first axis and translation of the tool head along the second axis, the first capping device operatively cooperates with the sample container holder to remove or install the sample container cap, and the tool head is configured to automatically position a working end of the specimen transfer device to obtain a specimen from a sample container held in the sample container holder, and to transfer the obtained specimen to an analytic element held by the analytic element holder, respectively, through one or both of rotation of the tool head about the first axis and translation of the tool head along the second axis.

2. The system of claim 1, wherein the sample container holder is configured to automatically rotate in one of a clockwise rotational direction and a counter-clockwise rotational direction while the first capping device engages the sample container cap in order to remove the sample container cap from a sample container held in the sample container holder, and wherein the sample container holder is configured to automatically rotate in the other one of the clockwise rotational direction and the counter-clockwise rotational direction while the first

capping device engages the sample container cap in order to install the sample container cap onto the sample container.

3. The system of claim 1, the plurality of sample processing tools disposed circumferentially about the tool head further comprising a pipettor carried on the tool head, the system further comprising a pipette tip dispenser, the pipettor having a pipette tip engaging member configured to releasably engage pipette tips, wherein the tool head is configured to automatically position the pipette tip engaging member proximate the pipette tip dispenser to allow the pipette tip engaging member to engage a pipette tip held by the pipette tip dispenser through one or both of rotation of the tool head about the first axis and translation of the tool head along the second axis.

4. The system of claim 3, wherein the pipette tip dispenser is mounted on a pipette tip dispenser transporter configured to translate the pipette tip dispenser relative to the tool head so that the pipette tip dispenser may be selectively translated to a location at which the tool head positions the pipette tip engaging member to engage a pipette tip from the pipette tip dispenser.

5. The system of claim 4, further comprising a pipette tip dispenser isolation chamber, wherein the pipette tip dispenser transporter is configured to selectively translate the pipette tip dispenser between the location at which the tool head positions the pipette tip engaging member to engage a pipette tip from the pipette tip dispenser and a second location within the isolation chamber.

6. The system of claim 4 or 5, further comprising a pipette tip waste bin mounted on the pipette tip dispenser transporter, wherein the pipette tip dispenser transporter is configured to selectively translate the pipette tip waste bin to a location at which the tool head positions the pipette tip engaging member to disengage a pipette tip into the pipette tip waste bin.

7. The system of claim 6, wherein the pipette tip waste bin is mounted on the pipette tip transporter relative to the pipette tip dispenser such that, when the pipette tip waste bin is translated to the location at which the tool head positions the pipette tip engaging member to

disengage a pipette tip into the pipette tip waste bin, the pipette tip dispenser is simultaneously translated into the isolation chamber.

8. The system of any of claims 3-7, further comprising a supplemental container holder configured for holding a supplemental container, wherein the tool head is configured to automatically position the pipette tip engaging member into a position in which a pipette tip engaged on the pipette tip engaging member is inserted into a sample container held in the sample container holder, and into a position in which the engaged pipette tip is inserted into a supplemental container held in the supplemental container holder, respectively, through one or both of rotation of the tool head about the first axis and translation of the tool head along the second axis.

9. The system of claim 8, the plurality of sample processing tools disposed circumferentially about the tool head further comprising a second capping device disposed on the tool head and configured to controllably grip and release a cap of a supplemental container held in the supplemental container holder, wherein the tool head is configured to automatically position the second capping device proximate the supplemental container cap through one or both of rotation of the tool head about the first axis and translation of the tool head along the second axis, and wherein the second capping device operatively cooperates with the supplemental container holder to remove or install the supplemental container cap.

10. The system of claim 9, wherein the supplemental container holder is configured to automatically rotate in one of a clockwise rotational direction and a counter-clockwise rotational direction while the second capping device engages the supplemental container cap in order to remove the supplemental container cap from the supplemental container, and wherein the supplemental container holder is configured to automatically rotate in the other one of the clockwise rotational direction and the counter-clockwise rotational direction while the second capping device engages the supplemental container cap in order to install the supplemental container cap onto the supplemental container.

11. The system of claim 9 or 10, wherein the first and second capping devices are offset from one another on the tool head such that, when the first capping device is in a position to grip and remove the sample container cap, the second capping device is in a position to grip and remove the supplemental container cap without further rotational movement of the tool head ~~tool~~.

12. The system of any of claims 8-11, further comprising a sample container held in the sample container holder and an aliquot container held in the supplemental container holder.

13. The system of claim 12, wherein when the tool head and pipettor operatively cooperate to automatically cause the pipette tip engaging member to engage a pipette tip from the pipette tip dispenser, draw an aliquot of a sample from the sample container using the engaged pipette tip, and dispense the obtained sample aliquot into the aliquot container, respectively.

14. The system of any of claims 8-11, further comprising a sample container held in the sample container holder and a reagent container containing a reagent held in the supplemental container holder, and wherein when the tool head and pipettor operatively cooperate to automatically cause the pipette tip engaging member to engage a pipette tip from the pipette tip dispenser, draw an aliquot of reagent from the reagent container using the engaged pipette tip, and dispense the reagent aliquot into the sample container, respectively.

15. The system of any of claims 1-14, the plurality of sample processing tools disposed circumferentially about the tool head further comprising a slide loading platform, wherein the analytic element positioner comprises a slide positioner and the analytic element comprises a slide, the system, wherein the slide positioner operatively cooperates with the tool head so that the slide holder automatically engages and removes a slide disposed on the slide loading platform, and wherein the slide positioner operatively cooperates with the tool head to automatically position an engaged slide proximate the working end of the specimen transfer device to transfer the specimen onto the engaged slide.

16. The system of 15, the plurality of sample processing tools disposed circumferentially about the tool head further comprising a reader configured for reading sample container indicia located on a sample container, the system further comprising a slide printer in communication with the reader and configured for printing slide indicia corresponding to the sample container indicia read by the reader onto a slide.

17. The system of any of claims 1-14, wherein the analytic element comprises a slide.

18. The system of claim 14, the plurality of sample processing tools disposed circumferentially about the tool head further comprising a reader configured for reading sample container indicia located on a sample container, the system further comprising an aliquot container printer in communication with the reader and configured for printing aliquot container indicia corresponding to the sample container indicia read by the reader onto an aliquot container.

19. The system of claim 9, further comprising a controller for controlling operation of one or more of the tool head, pipettor, first capping device, second capping device, and analytic element positioner, the system further comprising a user interface operatively coupled with the controller and configured for displaying system status and/or inquiries to a user, and for receiving user inputs in response to the displayed system status and/or inquiries.

20. The system of any of claims 1-19, wherein the working end of the specimen transfer device is configured to receive a filter thereon, the filter comprising a tubular body that forms a seal with the working end portion of the specimen transfer device and a porous membrane end portion that is configured to allow liquid to pass therethrough while retaining cellular matter on an outer surface thereof.