CLAIMS

1. An automated liquid handling system (100), comprising:

   an imaging station (102); and

   a collection apparatus (107),

   the imaging station configured to image a sample and transmit a sample image to a control computer (106),

   the imaging station (102) and the collection apparatus (107) operably linked to the control computer (106),

   the control computer (106) configured to process the sample image, and preferably the control computer (106) configured to define one or more extraction points from the sample, and

   wherein the collection apparatus (107) transfers a defined extraction volume from the sample to a sample collection vessel (110).

2. The automated liquid handling system (100) of Claim 1, wherein the imaging station (102) comprises a light source (103) and a sample storage apparatus (101), and the intensity of the light source (103) corresponds to a specific opacity of the sample storage apparatus (101), optionally wherein the intensity of the light source (103) is adjustable, and further optionally, the light source (103) located above, below, or oblique to the sample storage apparatus (101).

3. The automated liquid handling system (100) of Claim 1 or 2, wherein the defined extraction volume is between about 0 and 50 mL, optionally wherein the system (100) is configured to extract the defined extraction volume at an extraction rate between about 0.001 and 25 mL/s, further optionally, the system (100) configured to run an extraction program for extraction of a desired fraction from a sample.

4. The automated liquid handling system (100) of any of the preceding claims , wherein one or more of the imaging station (102), the collection apparatus (107), and the control computer (106), preferably the imaging station and the collection apparatus, are stand-alone components; or wherein one or more of the imaging station (102), the collection apparatus (107), the collection vessel, or the control computer (106), preferably the imaging station and the collection apparatus, are integrated into a single system.

5. The automated liquid handling system (100) of any of the preceding claims, wherein the imaging station (102) comprises a sample storage apparatus (101), a light source (103),

and an imaging device (105), preferably, wherein the imaging device comprises a camera, optionally wherein the sample storage apparatus (101), the light source (103), and the imaging device (105) are integrated into a single imaging station.

6. The automated liquid handling system (100) of any of the preceding claims, wherein the sample storage apparatus (101) comprises a tube rack, and/or a multi-well plate rack, and/or wherein the sample storage apparatus (101) has a specific opacity.
7. The automated liquid handling system (100) of any of the preceding claims, further comprising a graphical user interface that is operably linked to the control computer (106).
8. The automated liquid handling system (100) of Claim 1, wherein a collection apparatus (107) comprises a collection arm (108) and a collection device (109), optionally wherein the collection device (109) is removably attached to the collection arm (108).
9. The automated liquid handling system (100) of Claim 9, wherein the control computer (106) is configured to direct movement of the collection device (109) laterally, horizontally, and/or vertically along the collection arm (108), optionally wherein the collection arm (108) is configured such that it may be directed by the control computer (106) to move in an x, y, and/or z directions, further optionally, wherein the light source (103) is integrated into the collection arm (108), and further optionally wherein the control computer (106) is configured to direct the control arm (108) to position the collection device (109) at predetermined and/or operator determined extraction coordinates.
10. The automated liquid handling system (100) of Claim 9 or 10, wherein the collection device (109) comprises a means for sample transfer from the sample storage apparatus (101) to the sample collection vessel (110), preferably wherein the collection device (109) comprises a pipette, optionally wherein the collection device (109) comprises a needle and syringe, optionally wherein the automated liquid handling system (100) further comprises a tip rack and/or a tip disposal vessel.
11. A method (200) for automated extraction of material from a sample, comprising:

a. loading (202) one or more sample(s) onto an imaging station (102),

b. illuminating (203) the one or more sample(s) to generate one or more illuminated sample(s),

c. imaging (204) the one or more illuminated sample(s),

d. transmitting (205) one or more sample image(s) to a control computer (106),

e. calculating (208) an extraction volume and extraction coordinates based on the sample image, preferably wherein

f. directing (209) a collection arm (108) to orient a collection device (109) at the calculated extraction coordinates,

g. aspirating (210) an extraction material based on the calculated extraction volume from the one or more sample(s) into a collection device (109),

h. directing (211) the collection arm (108) to orient the collection device (109) to one or more collection vessel(s) (110), and

i. dispensing (212) the extraction material into the one or more collection vessel(s) (110),

and optionally repeating (214) steps b through h for each sample within the one or more sample(s).

12. The method of Claim 11, wherein calculating (208) an extraction volume and extraction coordinates based on the sample image comprises: defining (207) an extraction boundary, preferably, wherein defining the extraction boundary is performed by the control computer (106).

13. The method of Claim 11 or 12, further comprising centrifuging (201) the sample prior to loading onto the imaging station (102), optionally wherein the sample comprises a layered, gradated, or partitioned sample (104), optionally wherein the calculated extraction volume from the sample is extracted between 3-15 mL/min, and further optionally wherein the extraction material comprises one layer, gradation, or partition of a layered, gradated, or partitioned, sample.

14. The method of any of claims 11 to 13, using the automated liquid handling system (100) as claimed in any of claims 1 to 10.