flow cytometer. Furthermore, the prior art fails to teach any provision for rapidly washing the system with a cleaning liquid.

SUMMARY OF THE INVENTION

[0006] ~~A method for multiplexed sample analysis is provided comprising the steps of (a) robotically obtaining a first liquid sample from the first of a plurality of sample sources; (b) delivering the first liquid sample through a first line to an instrument for analysis of the sample (c) robotically obtaining a second liquid sample from the second of a plurality of sample sources; (d) delivering the second liquid sample through a second line to an instrument for analysis; (e) cleaning the second line while the first line is delivering sample to the instrument; and (f) cleaning the first line while the second line is delivering sample to the instrument. In one embodiment, the method further comprises step (g) repeating steps (a)-(f) to obtain and deliver multiple samples to the instrument from all of the plurality of sample sources. Preferably, the instrument is a flow cytometer. In another embodiment, the instrument is selected from the group consisting of a spectrofluorometer, a fluorometer, an absorbance meter, and a microscope.~~According to a first aspect, there is provided a method for multiplexed sample analysis, comprising: (a) robotically obtaining a first liquid sample from the first of a plurality of sample sources; (b) positioning a switching valve to fluidically couple the first liquid sample to an instrument; (c) delivering the first liquid sample through a first line to the instrument for analysis of the sample; (d) robotically obtaining a second liquid sample from the second of a plurality of sample sources; (e) switching the switching valve to fluidically couple the second liquid sample to the instrument; (f) delivering the second liquid sample through a second line to the instrument for analysis, wherein a second control valve is located within the second line; (g) cleaning the first line while the second line is delivering sample to the instrument, wherein cleaning the first line comprises: positioning a first control valve located in the first line to communicate liquid between the first line and a wash channel; and positioning the first control valve located in the first line to communicate liquid between the first line and a waste channel; and (h) cleaning the second line while the first line is delivering sample to the instrument, wherein cleaning the second line comprises: positioning the second control valve located in the second line to communicate liquid between the second line and the wash channel; and positioning the second control valve located in the second line to communicate liquid between the second line and the waste channel.

[0007] In an embodiment, the first and second liquid samples that are analyzed by the inspection instrument may be independently selected from the group consisting of chemical compounds, antibodies, beads, live cells, or fixed cells. Any sample typically analyzed by a flow cytometer, HPLC, spectrofluorometer, fluorometer, absorbance meter, microscope., or other high-throughput-instrument that receives liquid samples may be used.

[0008] In another embodiment, the method further comprises the steps of delivering a first reagent to the first liquid sample before the sample is delivered to the instrument and delivering a second reagent to the second liquid sample before the sample is delivered to the instrument. The first and second reagents may be independently selected from the group consisting of chemical compounds, antibodies, beads, live cells, or fixed cells. In still another embodiment, multiple reagents may be added to the sample before the sample is injected into the instrument.

[0009] In another embodiment, a control valve alternates delivery of cleaning fluid with the delivery of liquid sample in each of the first and second lines. The control valve may be connected to additional lines. Such lines may further provide the delivery

of air pressure or system liquid pressure. Additionally, such lines may further provide a waste channel.

[0010] ~~An apparatus for delivering samples to an instrument for analysis is provided comprising a first and a second sample delivery line, wherein the first sample delivery line comprises a first sample loading and injection branch and the second sample delivery line comprises a second sample loading and injection branch; a fluid flow management mechanism for alternately connecting the first and second sample delivery lines to the instrument; at least one cleaning fluid delivery line to supply cleaning fluid to the flow management mechanism, the first sample delivery line, and the second sample delivery line; at least one sample input channel; at least one control valve for alternately delivering cleaning fluid to the first and second sample delivery lines, so that sample and cleaning fluid alternately flow through the first and second sample delivery lines. In one embodiment, the at least one cleaning fluid delivery line supplies cleaning fluid to the entire system, including the inspection instrument.~~According to a second aspect, there is provided an apparatus for delivering samples to an instrument for analysis, comprising: a first sample delivery line, wherein the first sample delivery line comprises a first within the first sample delivery line; a second sample delivery line, wherein the second sample delivery line comprises a second sample loading and injection branch, a second sample holding loop, and a second control valve located within the second sample delivery line; a fluid flow management mechanism comprising a position switching valve for alternately connecting the first and second sample delivery lines to the instrument; at least one cleaning fluid delivery line to supply cleaning fluid to the first sample delivery line and the second sample delivery line; at least one sample input channel fluidically coupled to the first sample delivery line or to the second sample delivery line by the position switching valve; and a wash liquid selection valve for delivering cleaning liquid or system liquid to the first and second sample delivery lines, so that cleaning liquid and system liquid alternately flow through the first and second sample delivery lines.

[0011] In another embodiment, the fluid flow management mechanism comprises a position switching valve. The position switching valve may comprise a four-way two-position switching valve. The two-position switching valve may comprise two modes. In one embodiment, the first mode of the position switching valve fluidicly couples the first sample delivery line to the instrument and fluidicly couples the second sample delivery line to the sample input channel. In another embodiment, the second

mode of the position switching valve fluidicly couples the first sample delivery line to the sample input channel and fluidicly couples the second sample delivery line to the instrument.

[0012] In one embodiment, the sample loading and injection branches of the first and second sample delivery lines comprise symmetrical sample loading and injection branches. In another embodiment, the first sample delivery line comprises a first sample holding loop and the second sample delivery line comprises a second sample holding loop. In another embodiment, a first control valve is located within the first sample delivery line and a second control valve is located within the second sample delivery line. In some embodiments, the first and second control valves each comprise four fluidic channels capable of coupling the first and second sample holding loops to one of the four fluidic channels. These additional fluidic channels may be connected to output ports of

18. The apparatus of Claim 11, ~~1Is~~ wherein the apparatus further comprises a pump flow control valve that comprises an output port, and wherein one of the four fluidic channels is connected to the output port of die pump flow control valve.

19. The apparatus of Claim 17, wherein one of the four fluidic channels is connected to the at least one cleaning fluid delivery line.

20. The apparatus of Claim 17, wherein the apparatus comprises a waste disposal, and wherein one of the four fluidic channels is connected to the waste disposal.

21. The apparatus of Claim 17, wherein the apparatus comprises a controlled air pressure source, and wherein one of the four fluidic channels is connected to the controlled air pressure source.

22. The apparatus of Claim 11, wherein the at least one sample input channel comprises a robotic sampler positioning device.

23. The apparatus of Claim 22 wherein the robotic sampler positioning device comprises one or two arms.

24. The apparatus of Claim 23, wherein the robotic sampler positioning device comprises two arms and the second arm comprises a reagent transfer pump.

25. The apparatus of Claim 24, wherein the reagent transfer pump comprises a syringe.

26. The apparatus of Claim 11, wherein the apparatus further comprises an instrument coupled to the fluid flow management mechanism by an interface channel.

27. The apparatus of Claim 26, wherein the instrument comprises a flow cytometer.