CLAIMS

~~What is claimed is:~~

1. An instrument (100) comprising:

a reagent management system (104), ~~operable to be positioned in the instrument,~~ the reagent management system (104) comprising a plurality of reagent wells (132), each reagent well (132) operable to contain a reagent of a plurality of reagents positioned therein, the reagent management system (104) operable to select a flow of reagent from one of the plurality of reagent wells (132);

a flexible connection (106) comprised of a laminate stack ~~and operable to be positioned in the instrument~~, the flexible connection (106) comprising a first flexible channel (136) in fluid communication with the reagent management system (104), the first flexible channel (136) operable to route the flow of reagent therethrough; and

a flow cell (102), operable to be positioned in the instrument (100), the flow cell (102) comprising a flow channel (124) in fluid communication with the first flexible channel (136), the flow channel (124) operable to route the flow of reagent over analytes positioned in the flow channel (124); and

a detection module (126);

wherein the flow cell (102) is moveable by the instrument (100) relative to a fixed reference point (128) in the instrument (100)~~.~~,

wherein the flexible connection (106) comprises:

a top layer (210) defining a top of the first flexible channel (136);

a bottom layer (212) defining a bottom of the first flexible channel (136); and

an intermediate layer (214) defining a wall width and a channel width of the first flexible channel (136);

wherein a ratio of the wall width to the channel width is greater than about 2.5.

2. The instrument (100) of claim 1, wherein the flow cell (102) is moveable relative to the fixed reference point (128) in the instrument (100) while the detection module (126) is held stationary relative to the reference point (128).

3. The instrument (100) of claim 1, further comprising~~:~~

a cartridge (130), the cartridge (130) comprising the reagent management system (104), the flow cell (102) and the flexible connection (106),~~;~~

wherein, when the cartridge (130) is engaged with the instrument (100) and the flow cell (102) is engaged with the cartridge (130), the reagent management system (104) is fixed relative to the reference point (128) of the instrument (100) while the flow cell (102) is movable relative to the reference point (128) of the instrument (100).

~~4. The instrument of claim 1, wherein:~~

~~the reagent management system is positioned relative to the reference point within about a predetermined first tolerance range; and the flow cell is positioned relative to the reference point within about a second predetermined tolerance range, the first tolerance range being at least 10 times greater than the second tolerance range.~~

~~5~~4. The instrument (100) of claim 1, wherein the flexible connection (106) comprises a second flexible channel (138) in fluid communication with the flow channel (124) of the flow cell (102), the second flexible channel (138) operable to route the flow of reagent from the flow cell (102) to the reagent management system (104) after the flow of reagent has passed through the flow channel (124).

~~6~~5. The instrument (100) of claim ~~5~~4, wherein the flexible connection (106) comprises a slit (268) positioned between the first flexible channel (136) and the second flexible channel (138).

~~7~~6. The instrument (100) of claim 1, wherein the flexible connection (106) comprises a sinuous shape.

~~8. The instrument of claim 1, wherein the flexible connection comprises:~~

~~a top layer defining a top of the first flexible channel;~~

~~a bottom layer defining a bottom of the first flexible channel; and~~

~~an intermediate layer defining a wall width and a channel width of the first flexible channel;~~

~~wherein a ratio of the wall width to the channel width is greater than about 2.5.~~

~~9~~7. The instrument (100) of claim ~~8~~1, wherein the intermediate layer (214) is a plurality of sublayers.

~~10~~8. The instrument (100) of claim ~~8~~1, wherein the top layer (210), intermediate layer (214) and bottom layer (212) are bonded together utilizing one of an adhesive bonding process, a thermal bonding process ~~,~~or a direct laser bonding process.

~~11~~9. The instrument (100) of claim 1, wherein, as the flow of reagent is routed through the flow channel (124), a chemical reaction is performed between the flow of reagent and the analytes, the chemical reaction inducing the analytes to affect detectable properties related to the analytes; and

wherein the detection module (126) is operable to detect the detectable properties.

~~12~~10. The instrument (100) of claim 1, comprising a mechanical strain relief element (400) fixedly coupled to the flexible connection (106).

~~13~~11. The instrument of claim ~~12,~~10 wherein the mechanical strain relief element (400) is one of:

an epoxy bead (402),

a trough (410), or

a solid piece (430) having a first adhesive and a second adhesive bonded thereon.

~~14. A cartridge comprising:~~

~~a reagent management system operable to select a flow of reagent from one of a plurality of reagents contained in the reagent management system;~~

a flexible connection formed from a laminate stack and comprising a first flexible channel in fluid communication with the reagent management system, the first flexible channel being operable to route the flow of reagent therethrough; and

a flow cell comprising a flow channel in fluid communication with the first flexible channel, the flow channel operable to route the flow of reagents over analytes positioned in the flow channel;

wherein the flexible connection enables the flow cell to be moved relative to the reagent management system.

15. The cartridge of claim 14, wherein the flexible connection comprises a second flexible channel in fluid communication with the flow channel of the flow cell, the second flexible channel operable to route the flow of reagent from the flow cell to the reagent management system after the flow of reagent has passed through the flow channel.

16. The cartridge of claim 15, wherein the flexible connection comprises a slit positioned between the first flexible channel and the second flexible channel.

17. The cartridge of claim 14, wherein the flexible connection comprises a sinuous shape.

18. The cartridge of claim 14, wherein the flexible connection comprises:

a top layer defining a top of the first flexible channel;

a bottom layer defining a bottom of the first flexible channel; and

an intermediate layer defining a wall width and a channel width of the first flexible channel;

wherein a ratio of the wall width to the channel width is greater than about 2.5.

19. The cartridge of claim 14, comprising a mechanical strain relief element fixedly coupled to the flexible connection.

~~20. The cartridge of claim 19, wherein the mechanical strain relief element is one of:~~

~~an epoxy bead,~~

~~a trough, or~~

~~a solid piece having a first adhesive and a second adhesive bonded thereon.~~

~~21. A flexible connection module comprising:~~

~~a flexible connection formed from a laminate stack and comprising a first channel inlet via, a first channel outlet via, and a first flexible channel in fluid communication therebetween, wherein the first channel inlet via comprises a fluidic seal operable to connect to are agent management system outlet port and to enable a flow of reagent therethrough; and~~

~~a flow cell comprising an inlet port, an outlet port, and a flow channel in fluid communication therebetween, wherein the inlet port is in fluid communication with the first channel outlet via of the flexible connection, the flow channel operable to route the flow of reagent over analytes positioned in the flow channel.~~

~~22. The flexible connection module of claim 21, wherein the flexible connection comprises:~~

~~a second channel inlet via, a second channel outlet via and a second flexible channel in fluid communication therebetween;~~

~~wherein the second channel inlet via is in fluid communication with the outlet port of the flow cell; and~~

~~wherein the second channel outlet via comprises a fluidic seal operable to connect to a reagent management system inlet port and to enable the flow of reagent therethrough.~~

~~23. The module of claim 21, wherein the fluidic seal is a detachable fluidic seal operable to detachably connect to the reagent management system outlet port and to enable the flow of reagent therethrough.~~

~~24. The module of claim 21, comprising:~~

~~a support fixture comprising an inner border surrounding the flow cell, the support fixture operable to contain the flow cell within the inner border and to enable the flow cell to move laterally and longitudinally therein.~~

~~25. The flexible connection module of claim 21, comprising a mechanical strain relief element fixedly coupled to the flexible connection.~~

~~26. The flexible connection module of claim 25, wherein the mechanical strain relief element is one of:~~

~~an epoxy bead,~~

~~a trough, or~~

~~a solid piece having a first adhesive and a second adhesive bonded thereon.~~