ment guide attached to the cartridge tray that is configured to engage with and control movement of the mounting frame. The assay cartridge may include a flow cell having a sample chamber, a detection chamber and an outlet, wherein the sample chamber, the detection chamber, and the outlet define a flow path through the flow cell, the detection chamber comprising a plurality of electrodes. The actuator may include a motor and a lead screw cooperating with a lead screw nut affixed to the cartridge tray, wherein the motor is configured to turn the lead screw to translate the lead screw nut, to move the cartridge tray along the rail. The one or more reader components are selected from the group consisting of (i) a photodiode assembly comprising at least one photodiode; (ii) an ampoule breaking mechanism; (iii) an electrode contact pin assembly; (iv) a fluidic manifold configured to drive fluid motion within the flow path; and (v) a bar code reader. The enclosure may be a light-tight enclosure and the enclosure further comprises a door to seal the light-tight enclosure. In one embodiment, the one or more reader components include the ampoule breaking mechanism and the ampoule breaking mechanism is affixed to the mounting frame. Still further, the one or more reader components may include the electrode contact pin assembly and the electrode contact pin assembly is affixed to the mounting frame and supports conductive pins configured to make electrical contact to the plurality of electrodes on the assay cartridge. The one or more reader components may further include the fluidic manifold and the fluidic manifold is affixed to the mounting frame and comprises an additional element selected from the group consisting of fluidic connectors to mate with a vent port in the assay cartridge, an air cylinder pump, a plurality of valves, and combinations thereof.

[0026] The alignment guide may include a vertical tab and the mounting frame comprises an engagement pin and rollers, wherein the enclosure further comprises tracks on each side of the mounting frame, wherein the rollers are received by the tracks and the vertical tab contacts the engagement pin during movement of the cartridge tray, causing the mounting frame to translate along the tracks in coordination with the cartridge tray. Still further, the tracks comprise at least one downward sloping region and a flat region, and (i) movement within the sloping region causes the mounting frame to be lowered relative to the cartridge tray for cartridge processing; and (ii) movement within the flat region causes the mounting frame to move along with the cartridge tray while remaining in vertical and horizontal alignment for cartridge processing. In one embodiment, the rollers move within the downward sloping regions, the engagement, pin is received in a notch defined on the alignment guide. The mounting frame may include two rollers on each side of the mounting frame and the rollers are each received in tracks. Still further, the alignment guide comprises a notch adjacent to the vertical tab and configured to receive the pin, the pin engaging the notch to releasably hold the mounting frame into horizontal alignment. Moreover, the cartridge tray may include vertical guides configured to engage the mounting frame, wherein the vertical guides define the vertical height of the mounting frame relative to the cartridge tray. The track may comprise an elevated shelf region on which the rollers rest when the mounting frame is not engaged by the alignment guide, wherein the elevated shelf region is connected to the downward sloping region. In one embodiment, the elevated shelf region is connected to the downward sloping region at the apex of the downward sloping region.

[0027] The cartridge reader of the present invention may include a cartridge tray with a locking mechanism. In one embodiment, the assay cartridge comprises a skirt and the cartridge tray comprises a slot sized to receive the skirt. The slot may be positioned on an exterior surface of the assay cartridge. In addition, the locking mechanism comprises a spring loaded rotating latch, a first pin configured to engage with the assay cartridge, a second pin configured to engage with a notch on the assay cartridge, wherein movement of the assay cartridge onto the cartridge tray contacts the first pin causing the latch to rotate and the second pin to engage with the notch. The spring loaded rotating latch may include a spring to resist the rotation of the latch, and optionally, the resistance of spring is reduced as the second pin engages with the notch. The latch may also include a tab and the locking mechanism further comprises an optical sensor, wherein the tab is configured to cover the optical sensor when the locking mechanism is engaged. The tab may include a pin extending down toward the optical sensor.

[0028] The one or more reader components may include the photodiode assembly and the photodiode assembly comprises a traveler block including positioning pins extending from the traveler block, the positioning pins being configured to couple motion of the mounting frame to the lateral motion of the traveler block. Moreover, the enclosure further comprises a cartridge tray positioning optical sensor, and optionally, an additional optical sensor to control the movement of a fluid slug in the assay cartridge.

[0029] The cartridge tray may further comprise an integrated heater and/or a coating including a water-resistant seal. The seal may include a polymeric film and it may transmit infra-red light. In one embodiment, the seal does not transmit visible light.

[0030] The photodiode assembly may also include an alignment component to align the photodiode with a region on the assay cartridge. The at least one photodiode may be mated to an optical coupler, and optionally, the at least one photodiode is mated to a light guide. In one embodiment, the optical coupler is surrounded by a conductive shield. The at least one photodiode may be mounted to the traveler block, the traveler block being configured to move side-to-side along at least one guide cylinder mounted in the photodiode assembly. The traveler block may be spring loaded and is movable when a force sufficient to overcome the spring force is applied. The cartridge reader may be configured to analyze an assay conducted in an assay cartridge comprising an ampoule, the cartridge reader comprising an ampoule breaking mechanism comprising a hammer element. The hammer element may be coupled to an active drive element selected from the group consisting of a motor, a solenoid, and a spring. In one embodiment, the hammer element is coupled to a spring and the hammer is held under a spring force. The hammer element may include a lever arm including a striking face, e.g., a protruding striking face, which is optionally pointed. The hammer element may be configured to be raised and lowered relative to the assay cartridge by rotation of the hammer element around a hammer axle, and optionally, the hammer element further comprises a control surface in coordination with a cam affixed to a rotating control axle, wherein the rotation of the control axle raises and lowers the striking face relative to the assay cartridge. The cam may include a mechanical stop positioned on a surface of the cam, and optionally, the cam is in coordination with a mechanical step positioned on an additional element of the ampoule breaking