CLAIMS

1. A flow cell system, comprising:

a socket comprising a base portion, a plurality of electrical contacts, and a cover portion coupled with the base portion comprising at least one first port, wherein the base portion and the cover portion cooperatively form an enclosure, wherein the electrical contacts extend between the enclosure and an exterior side of the base portion, and the at least one first port extends between the enclosure and an exterior side of the cover portion; and

a flow cell device secured within the enclosure of the socket, comprising:

a frameless light detection device comprising a base wafer portion, a plurality of dielectric layers extending over the base wafer portion, a reaction structure extending over the dielectric layers that comprises a detector surface, a plurality of light sensors, device circuitry extending through the dielectric layers electrically coupled to the light sensors to transmit data signals based on photons detected by the light sensors, and a plurality of light guides associated with the light sensors; and

a lid extending over the detector surface with a flow channel therebetween, the lid comprising at least one second port in communication with the flow channel and the at least one first port of the socket,

wherein the device circuity of the light detection device of the flow cell device is electrically coupled to the electrical contacts of the socket, wherein the flow cell device further comprises a substrate portion coupled to and extending over the base wafer portion that defines the back side of the flow cell device, wherein the substrate portion comprises a plurality of electrical leads extending therethrough from the back side of the flow cell device, further comprising side wall portions extending from the substrate portion, the substrate portion and the side wall portions forming a cavity, and wherein the light detection device is positioned within the cavity, wherein the substrate portion and the side wall portions comprise ceramic land chip carrier or an organic land chip carrier.