

trap **3226** (preferably connected to bubble trap vent port **3266**) for removing air from the extracted sample and waste chamber **3228** (which is preferably connected to waste vent port **3262**). Further downstream, sample conduit **3224** is connected to detection chamber **3230**. Sample conduit **3224** comprises pill zone **3225** which may hold labeled binding reagents (e.g., labeled antibodies for use as detection reagents in sandwich immunoassays) and/or a neutralization reagent (e.g., a pH buffering component such as Tris, Hepes, phosphate and the like) for neutralizing an acidic extraction reagent in the sample (such as nitrous acid).

[0248] Detection chamber **3230**, preferably, comprises immobilized binding reagents for analytes of interest, preferably an array of binding reagents, preferably an array of binding reagents supported on electrode arrays for conducting ECL measurements as described for other cartridge embodiments above. In an especially preferred embodiment the binding reagents are antibodies directed against markers of organisms (preferably including at least one gram positive bacteria, most preferably a *Streptococcus* species) that may be found in mucus-containing sample such as upper respiratory samples (see, e.g., the organisms described in U.S. Provisional Patent Application 60/436,591, filed Dec. 26, 2002, entitled Methods Compositions and Kits for Biomarker Extraction, hereby incorporated by reference). Detection chamber **3230** is connected to wash reagent chamber **3240** via wash reagent conduit **3242** (which, preferably, comprises a Z-transition). Vent port **3244** is arranged along wash reagent conduit **3242** between detection chamber **3230** and wash reagent chamber **3240**. Wash reagent chamber **3240** is also connected to vent port **3241**. Wash reagent chamber **3240** comprises a liquid wash reagent, preferably in an ampoule. The liquid wash reagent, preferably, comprises an ECL coreactant and provides an appropriate chemical environment for an ECL measurement.

[0249] The fluidic arrangement of cartridge **3200** allows for forward flow of extracted sample through pill zone **3225** into detection chamber **3230** and reverse flow of sample into waste chamber **3228** and wash reagent from wash reagent chamber **3240** into detection chamber **3230**.

[0250] Cartridge **3200** also has optional control detection chamber **3250** which is preferably configured like detection chamber **3230**. The fluidic arrangement of the cartridge allows wash reagent from wash reagent chamber **3240** to pass through pill zone **3252** to detection chamber **3250**. Pill zone **3252**, preferably, comprises the same binding reagents as pill zone **3225** but also comprises control reagents (preferably, predetermined amount of the analytes measured in detection chamber **3230**) so that reconstitution with wash reagent forms a control sample. The fluidic arrangement further allows the forward flow of control sample into waste chamber **3254** (which is preferably connected to waste vent port **3264**) and wash reagent from wash reagent chamber **3240** into detection chamber **3250**.

[0251] As shown in FIGS. 32 and 33, cartridge **3200**, preferably, employs many of the same design features as preferred embodiments of cartridge **900** and/or **1400** such as use Z-transitions, laminar construction, electrode arrays, bridge segments, and the like. As shown in FIG. 33, cartridge **3300**, preferably, has a two part design. Advantageously, this design allows the sample chamber to be constructed from two sections and simplifies the manufacture of

the curved/angled elongated chamber. As shown in FIG. 33, cartridge **3200** may also comprise a bar code **3295** or other identifying feature that can, e.g., identify the assay panel carried out on the cartridge, the cartridge lot, the time of manufacture, the expiration date, cartridge specific calibration data, the sample source, etc.

[0252] The fluidic components are preferably adapted and configured to form a fluidic system that can be selectively controlled via a cartridge reader instrument. The cartridge reader **2300** is schematically depicted in FIG. 23 and preferably incorporates various subsystems for performing the predetermined assay. The cartridge reader is shown holding a cartridge **2390** which may be supplied separately. As depicted, the cartridge reader preferably includes the cartridge handler **2315**, the fluidic handler **2340** and the assay electronics **2330** subsystems. Together these subsystems are preferably controlled by an electronic control system **2310** responsible, generally, for directing the cartridge handler subsystem to load and position the cartridge within the reader, for controlling/coordinating the introduction/movement of fluids throughout the fluidic network and for directing the assay electronics to perform the assay measurement. The cartridge reader is preferably packaged as a single self-contained unit. In preferred embodiments employing luminescence based assays, a smaller light-tight region is incorporated within the overall cartridge reader housing. This allows the luminescence based assay to be performed within the light tight enclosure to ensure that the readings are not affected by ambient light. Preferably, electronic components and other heat-generating components are located outside of the light tight enclosure.

[0253] The cartridge handler subsystem preferably includes a motor to draw the cartridge into the cartridge housing and selectively position the cartridge within the cartridge reader; e.g., position the cartridge under a sensor/detector **2335**. In one preferred embodiment, retraction of the cartridge within the cartridge reader housing may be mechanically coupled to one or more mechanisms within the cartridge reader for synchronized/coordinated operation of the linked mechanisms. For example, the retraction of the cartridge may be mechanically coupled to: the mechanism for closing the door **2325** to the light tight enclosure after the cartridge has entered the chamber; the assay electronics subsystem (described in greater detail below) to allow the cartridge reader's electrical contacts **2330** to engage the cartridge's electrical contacts, i.e., be placed into electrical contact with the electrode array's electrode contacts; the fluidic handler subsystem's (described in greater detail below) fluidic manifold **2340** to engage the cartridge's fluid ports, i.e., be placed into fluidic communication with the cartridge's fluidic ports (e.g., establishing a pressure seal between the cartridge's fluidic ports and the fluid manifold); and/or the fluid handler subsystem's reagent module breaking mechanism **2350** to allow the reagent modules such as ampoule(s) to be broken during the cartridge retraction/positioning step.

[0254] In certain embodiments the measurement step may comprise reading the signal from each read chamber separately. While this may be accomplished by using a single suitable detector and optimal positioning of the cartridge's read chambers in relation to the single detector, successful measurement/detection may also be carried out by repositioning the desired read chamber in relation to the single