though-hole within the cartridge body. The fluidic networks may be defined, at least in part, by recesses in the cartridge body and/or cover layers. In addition, at least one of the fluidic networks may be defined, at least in part, by apertures within a gasket layer disposed between the cartridge body and at least one cover layer.

[0026] Additionally, embodiments including a z-transition capillary break, the z-transition may comprise, in series, first, second, third, fourth and fifth sample conduit segments, each of the segments being connected at an angle to the adjacent segments and the segments being oriented so that the first and fifth segments are in the first fluidic networks, the third segment is in the second fluidic network and the second and fourth segments are cartridge body through-holes.

[0027] Still further, the assay cartridge may comprise a dry reagent in the sample conduit. The dry reagent may comprise, e.g., a labeled binding reagent, a blocking agent, an ECL coreactant and/or an extraction buffer neutralization reagent. In yet another embodiment, the assay cartridge may comprise an air vent port connected to the sample conduit. In still yet another embodiment, the assay cartridge may comprise a vented reagent chamber and a reagent chamber conduit connecting the reagent chamber with the sample conduit. The reagent chamber may comprise a liquid reagent which may optionally be contained within a reagent ampoule in the reagent chamber. The reagent chamber conduit may also be connected to an air vent port.

[0028] The reagent conduit may include a dry reagent; the dry reagent may comprise, e.g., a labeled binding reagent, a blocking agent, an ECL coreactant and/or an extraction buffer neutralization reagent. The liquid reagent may be, e.g., a wash buffer, an extraction buffer, an assay diluent and/or an ECL read buffer. The extraction buffer is, preferably, nitrous acid or a nitrate salt.

[0029] In another embodiment the assay cartridge may further comprise a second reagent chamber holding a second liquid reagent, a second reagent chamber vent port connected to the second reagent chamber and a second reagent chamber conduit connecting the second reagent chamber with the sample conduit.

[0030] The detection chambers in the cartridges of the invention preferably include an array of binding reagents as described above. Still further, the detection chamber may comprise one or more electrodes having binding reagents immobilized thereon as described above.

[0031] In other embodiments the assay cartridge may further comprise a second waste chamber, a second waste chamber vent port connected to the second waste chamber and a second detection chamber connected to the sample chamber or the first sample conduit by a second sample conduit and to the second waste chamber by a second waste conduit. In addition, at least a portion of one wall of the detection chamber may be substantially transparent to allow optical monitoring of materials in the detection chamber. The assay cartridge may also comprise a second detection chamber connected to the sample chamber or the first sample conduit by a second sample conduit and to the first waste chamber by a second waste conduit. Similarly, at least a portion of one of the cover layers may be substantially transparent to allow the monitoring of fluid flow within said cartridge.

[0032] In other embodiments, the cover layers may have a first region comprising a patterned array of immobilized binding reagents defining a surface of the detection chamber and a second region having a dry reagent thereon defining a surface of the sample conduit. The cartridge may also have two second side cover layers defining two second side fluidic networks and a first side bridge cover layer that connects the two second side fluidic networks. In certain embodiments, the dry reagents may be on the first side bridge cover layer.

[0033] In yet a still further embodiment, an assay cartridge for analyzing a sample collected with an applicator stick comprising a shaft and a sample collection head, may comprise a sample chamber having an elongated cavity that has a first elongated region and a second elongated region, the regions being oriented at an angle with respect to each other to bend the shaft upon insertion of the applicator stick into the sample chamber and promote fracture of the shaft. The angle is preferably between 30 and 70 degrees. Also, in some embodiments the cross-sectional area of the cavity is less than 2 times the width of the applicator stick head. The fracture preferably produces a shortened stick fragment that includes the sample collection head where the length of the fragment is less than the length of the cavity. The cartridge also may include a sealable closure for sealing the sample compartment with the shortened stick fragment in the cavity.

[0034] Other embodiments for an assay cartridge may comprise an extraction reagent chamber for holding an extraction reagent, a sample chamber having sample introduction port with a sealable closure wherein the sample chamber is adapted to receive an applicator stick and a first detection chamber (preferably, a detection chamber having one or more binding domains having immobilized binding reagents, more preferably, one or more binding domains on one or more electrodes, most preferably an electrode array of the invention as described above) connected to the sample chamber by a first sample conduit. The sample chamber is connected to the extraction reagent chamber by an extraction reagent chamber conduit. A filter may optionally be included between the sample chamber and the sample conduit. The sample and extraction reagent conduits may be connected to and arranged along the length of the cavity. The extraction reagent, preferably, comprises nitrous acid or a nitrate salt.

[0035] Yet another embodiment of an assay cartridge comprises a wash reagent chamber for holding a wash reagent and a detection chamber (preferably, a detection chamber having one or more binding domains having immobilized binding reagents, more preferably, one or more binding domains on one or more electrodes, most preferably an electrode array of the invention as described above), wherein the wash reagent chamber and the waste chamber are connected to the detection chamber via a wash conduit and a waste conduit, respectively. Alternatively, the waste chamber may be connected to the detection chamber via a waste conduit and the wash reagent chamber connected to the sample conduit via a wash conduit.

[0036] In accordance with another aspect of the invention, a method of performing a cartridge based assay is disclosed. The method generally comprises moving the sample from the sample chamber into the first sample conduit branch. The dry reagent is reconstituted in the sample and a sample slug having a predetermined volume is moved into the detection