[0054] The reaction chamber **143** may be a chamber formed in the cartridge **101**. Alternatively, the reaction chamber **143** may be formed in a separate reaction vessel designed to be coupled to the cartridge to receive the eluted analyte. Suitable reaction vessels for this purpose are disclosed in International Application Number PCT/US98/03962 filed Mar. 2, 1998 and entitled "Heat Exchanging, Optically Interrogated Chemical Reaction Assembly", the disclosure of which is incorporated by reference herein. The application also teaches a thermal sleeve for receiving and thermally cycling the reaction chamber. For this reason, it is advantageous for the reaction chamber to protrude from the rest of the cartridge body to facilitate insertion of the reaction chamber into the thermal sleeve.

[0055] The cartridge **101** also includes a storage chamber **109** for storing a lysing reagent, and a storage chamber **125** for storing a washing reagent. The cartridge **101** further includes flow controllers **123**, such as valves or fluid diodes, for controlling the flow of fluid through the cartridge. The cartridge **101** also preferably includes resistive sensors **115** for sensing the presence of fluid in various channels and regions.

[0056] Referring to FIG. **3**, the cartridge **101** is preferably used in combination with a portable, i.e. hand-held or desktop, external instrument **211** designed to accept one or more of the cartridges 101. The connection between the disposable cartridge **101** and the external instrument **211** is preferably by means of a thin, card-like section of the cartridge **101**, and a mating connector within the instrument **211**. This type of connection is similar to the standard card edge connectors used with printed circuit boards in, e.g., personal computers or card cages.

[0057] As shown in FIG. **2**, narrow fingers **151** of conductive material on the card or on foil come in contact with gold connectors in the instrument as the cartridge **101** is inserted for processing. Many connections can be made within a small width of cartridge in this implementation. In the case of the cartridge, the card may be a thin section of molded plastic or a sheet on which conductive materials are deposited.

[0058] Electrical connections may also be used to transfer information to and from stored memory and/or intelligence on the cartridge **101**. For example, a memory or microprocessor chip may be incorporated as part of the cartridge. This chip preferably contains information such as the type of cartridge, program information such as specific protocols for the processing of the cartridge, tolerances for accept and reject, serial numbers and lot codes for quality tracking, and provision for storing the results of the processing.

[0059] Integrated electronic memory on the cartridge **101** allows for rapid, easy, and error-free set-up of the instrument **211** for different fluidic processing protocols. When a cartridge is inserted into the instrument, the instrument may electronically address the memory on the cartridge, and thus automatically receive the appropriate set of instructions for controlling the time-sequence of fluidic operations to be carried out with the inserted cartridge. The instrument **211** may simply sequentially retrieve and execute each step in the cartridge's memory, or download its contents so that the user may edit the sequence using, e.g., keyboard **213**.

[0060] If suitable memory is included on the cartridge, such as writable memory (e.g., erasable programmable read-only memory (EPROM), electrically erasable programmable read-only memory (EEPROM), etc., intermediate and final results, based on the sample introduced into the cartridge, could be written by the instrument into the cartridge's memory for co-located storage with the physical sample after processing. This is particularly advantageous in applications where archiving of samples and results is necessary, such as forensics.

[0061] In addition, other information can be stored in the memory on the cartridge, in unalterable (or alterable) forms. For example, cartridge serial number, lot manufacture information, and related information could be pre-programmed and unalterable. User data, technician identification number, date of test, location of test and instrument serial number could be unalterably written into the cartridge. This allows for easy identification of the "chain of custody" in the handling of a specimen. Engineers skilled in the art of data storage will recognize that other memory means than electronic can be used, such as optically-addressed printed regions (e.g., ink-jet or thermal), magnetic strips, etc.

[0062] Electrical power may be provided to the cartridge **101** from the external instrument **211**. Alternatively, instead of making the instrument bulkier and heavier by adding batteries to accommodate the power needs of multiple cartridges used sequentially to process many samples, the power source for each cartridge may be included on the cartridge, sufficient to power the instrument and cartridge.

[0063] The instrument **211** preferably includes processing electronics, e.g., one or more microprocessors, multiplexers, power control circuits, and sensor circuits, for controlling the operation of the cartridge **101**. The processing electronics are connected by the contact fingers **151** and electrical leads **147** to various regions, storage areas, pumps, sensors, and channels in the cartridge **101**. Alternatively, there may be other data links of the cartridge to the instrument, such as radio frequency or infrared links. Although the processing electronics are physically located in the external instrument **211** in the preferred embodiment, it is to be understood that the processing electronic may also be located on the cartridge **101**.

[0064] Both external and internal fluid motive sources are suitable for use with the cartridges disclosed herein. The fluid motive source may be contained in or on the cartridge **101** itself, or may be external to the cartridge, e.g., included in the external instrument **211** into which the cartridge **101** is inserted for processing. One type of fluid motive source described in this disclosure is an electrolytic pump (e-pump) located inside the cartridge **101**. The fluid inside a sealed pouch is decomposed into gaseous elements by an electrical current, thereby pressurizing and expanding the pouch. This sealed pumping pouch, or e-pump, is positioned against a reagent pouch and forces the contents of the reagent pouch into the fluidic circuit as the pumping pouch expands.

[0065] Other types of fluid motive sources may also be used with the cartridges of the present invention. For example, a stepper motor or solenoid can be used to provide a force and press against a reagent pouch inside the cartridge, thereby forcing the contents of the reagent pouch into the fluidic circuit. Alternatively, a mechanical spring located either inside the cartridge or inside the external instrument may provide the motive source for pressing on the reagent pouch and forcing the reagent into the fluidic circuit. The mechanical energy stored in the spring may either be built into the cartridge during manufacture or be generated during insertion of the cartridge into the instrument (i.e. cocking the spring during manual insertion of the cartridge).

[0066] Other potential fluid motive sources include a pneumatic pressure source (or vacuum source) located inside the