[0044] Microfluidic system **10** further optionally comprises a display **20** that communicates information to a user of the system. Such information includes but is not limited to: the current status of the system; progress of sample preparation; and a warning message in case of malfunction of either system or cartridge. Display **20** is preferably used in conjunction with an input device **32**, through which a user may communicate instructions to system **10**. Input device may be a touch-screen, a key-pad, or a card-reader. Input device **32** may further comprise a reader of formatted electronic media, such as, but not limited to, a flash memory card, memory stick, USB-stick, CD, or floppy diskette. Input device **32** may further comprise a security feature such as a fingerprint reader, retinal scanner, magnetic strip reader, or bar-code reader, for ensuring that a user of system **10** is in fact authorized to do so, according to pre-loaded identifying characteristics of authorized users. Input device **32** may be additionally linked to an external input device (not shown in FIG. **1**) such as a computer keyboard, or a computer mouse, for accepting a user's instructions. Input device **32** may additionally—and simultaneously—function as an output device for writing data in connection with sample analysis. For example, if input device **32** is a reader of formatted electronic media, it may also be a writer of such media. Data that may be written to such media by device **32** includes, but is not limited to, environmental information, such as temperature or humidity, pertaining to an analysis, as well as a diagnostic result, and identifying data for the sample in question.

[0045] System **10** preferably includes microprocessor circuitry, in communication with input device **32** and display **20**, that accepts a user's instructions and controls analysis of samples. System **10** may further include a computer network connection that permits extraction of data to a remote location, such as a personal computer, personal digital assistant, or network storage device such as computer server or disk farm. The computer network connection may be wireless, or may utilize, e.g., ethernet, firewire, or USB connectivity. System **10** may also be connected to a printer, either directly through a directly dedicated printer cable, or wirelessly, or via a network connection. System **10** may further be configured to permit a user to e-mail results of an analysis directly to some other party, such as a healthcare provider, or a diagnostic facility, or a patient.

[0046] FIG. **2**A shows an exploded view of an exemplary cartridge receiving element **12**, from system **10**. In this. embodiment, receiving element **12** is configured to accept a multi-sample cartridge having eight sample lanes. Eight PCR tubes **42** may contain reagents for reacting separately with samples in each of the lanes of the cartridge. Such reagents are typically lyophilized reagents such as PCR enzymes, probes and/or primers. Such reagents can experience significant degradation if exposed to temperatures such as room temperature or above and therefore PCR tubes **42** are preferably kept cool in order to prolong reagent lifetime. A preferable manner by which to keep such tubes cool is with a Peltier device (not shown in FIG. **2**A). PCR tubes **42** are preferably attached to a PCR-strip **44** for ease of collective mounting. PCR tubes **42** are also shown situated above a shelf having a number of depressions **43** configured to accept the PCR tubes. The depressions **43** can be situated within a cooling device, such as Peltier cooler, to keep the PCR tubes cool when the tubes are sitting in the depressions. In some embodiments the depressions are holes that are deep enough to accept the PCR tubes as deep as their rims.

[0047] The remainder of the cartridge receiving element is now described in conjunction with FIG. **2**B, which illustrates a way of inserting a multi-sample cartridge **18** into a cartridge receiving element **12** of system **10**. Insertable cartridge **18** comprises at least one microfluidic component that, when inserted into receiving element **12**, in conjunction with a heating element and control circuitry, is configured to accept one or more polynucleotide containing samples and one or more reagents, and to react the sample and the reagents, in order to produce a prepared sample, delivered to the one or more PCR tubes and in a form suitable for subsequent analysis of the one or more polynucleotides therein. Features of cartridge **18** are further described elsewhere herein.

[0048] Cartridge receiving element **12** preferably includes a way of ensuring effective registration of the cartridge, via a registration mechanism. A mechanical key on the cartridge, as further described herein, facilitates registration and may be used in conjunction with one or more other mechanical features. Adjustable lever **40**, in FIGS. **2**A and **2**B, is a way of ensuring that a cartridge makes a firm contact in a cartridge receiving element. Although there are many configurations of a lever that can achieve such a contact, it is envisaged that in the embodiment shown in FIGS. **2**A and **2**B, the cartridge is inserted horizontally into the cartridge receiving element in the direction of the arrow shown, pushed back into the receiving element in order to engage a mechanical key, and then lever **40** is raised underneath the cartridge in a manner that supports the cartridge. Lever **40** may pivot on a cam to provide additional rigidity when engaged with the cartridge. Shelf **49** attached to lever **40** may provide additional support for the cartridge in the embodiment shown in FIG. **2**A. Other registration mechanisms may be contemplated, such as utilizing one or more clips, a magnetic attraction, a recessed cavity in which to situate the cartridge, and a snap-fit piece to which the cartridge becomes reversibly fixed, such as by a twisting motion, the locking of the cartridge achieved by a slight deformation of one or more male fittings, e.g., one or more flexible protrusions of either the cartridge or the receiving element, when inserted into one or more complementary female fittings. In other embodiments, the cartridge is positioned at an angle to the horizontal, such as 10° with respect to horizontal, to facilitate flow of sample from the lysis chamber into a microfluidic component of the cartridge. In such embodiments, it is less important to deploy a funnel structure with ramps such as 197 in the lysis chamber, as further described herein with respect to FIGS. **4**A and **4**B.

[0049] Cartridge receiving element also preferably includes a heat source capable of delivering controllable and localized heat to selected portions of the cartridge. Platform **46** in FIGS. **2**A and **2**B is an area having a plurality of thermal actuators, on which the cartridge rests during analysis, and which is in thermal communication with the cartridge. The plurality of thermal actuators, such as resistive heaters, are configured to heat one or more regions of the cartridge. Microprocessor control circuitry, not shown, is in communication with platform **46** and upon receiving user instructions will cause current to flow to selected thermal actuators to thereby cause one or more regions of the cartridge adjacent to the selected actuators to heat up. In