centration of the analyte in the sample of interest. In some embodiments, the molecular readers disclosed herein can be configured to compare measured concentrations of multiple analytes in a sample to interest to reference data (e.g., reference tables of data and/or an expert systems-derived algorithm) to provide a disease diagnosis, a water quality assessment, or another type of estimation, judgment, or determination regarding the quality, condition, or state of the sample of interest. Each of the foregoing functions can be implemented in molecular reader **100** in software, in hardware, or in a combination of hardware and software.

The program code is applied to input data to perform the functions described herein and generate output information which is applied to one or more output devices. Each such computer program can be implemented in a high-level procedural or object-oriented programming language, or an assembly or machine language. Furthermore, the language can be a compiled or interpreted language. Each such computer program can be stored on a computer readable storage medium (e.g., CD ROM or magnetic diskette) that when read by a computer can cause the processor in the computer to perform the analysis and control functions described herein.

V. Applications

In the preceding discussion, molecular reader **100** has been applied to the detection and quantification of a variety of biological molecules and structures, including amino acid-based molecules such as protein, and nucleic acid-based molecules such as DNA and RNA. More generally, molecular reader **100** can also be used to detect and quantify other types of biological chemical species, including chemical weapons, explosives, and environmental pollutants. Molecular reader **100** can be implemented as a stand-alone devices, or as part of a larger instrument such as a laboratory microscope. Further, molecular reader **100** can implement particular analysis protocols according to the instructions of a system operator; for example, reader **100** can be configured to perform immunoassays to detect various types of chemical and biological agents.

Exemplary applications of reader **100** include performing assays to detect any one or more of the following different types of compounds: petroleum compounds, see for example U.S. Pat. No. 5,015,586; chemical nerve agents, see for example Bencic-Nagale, S. et al., "Microbead Chemical Switches: An Approach to Detection of Reactive Organophosphate Chemical Warfare Agent Vapors," J. *Am. Chem. Soc.* 128: 5041-5048 (2006); polychlorinated biphenyls, see for example U.S. Pat. Nos. 5,834,222 and 5,858,692; pesticides, see for example U.S. Pat. Nos. 5,981,196, 5, 981,298, and 6,635,434; herbicides, see for example U.S. Pat. No. 4,780,408; and water treatment polymers, see for example U.S. Pat. No. 6,420,530. The entire contents of all of the foregoing publications and U.S. patents are incorporated by reference herein.

Other Embodiments

A number of embodiments have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the disclosure. Accordingly, other embodiments are within the scope of the following claims.

What is claimed is:

1. A system, comprising:

a support apparatus configured to detachably receive a chip;

a plurality of movable pins extendible from a first position to a second position, wherein:

in the first position, the movable pins do not contact the chip when the chip is positioned on the support apparatus; and

in the second position, the movable pins contact electrical terminals of a heating element within the chip when the chip is positioned on the support apparatus;

a radiation source configured to direct radiation to be incident on the chip when the chip is positioned on the support apparatus;

a detector configured to detect radiation emitted from the chip when the chip is positioned on the support apparatus; and

an electronic processor in electrical communication with the plurality of movable pins and the detector, wherein the electronic processor is configured to detect molecules in a sample positioned within the chip by analyzing the detected radiation, and to determine a temperature of the chip by measuring an electrical resistance between two of the multiple pins connected to the electrical terminals.

2. The system of claim **1**, wherein the electronic processor is configured to cause at least some of the plurality of movable pins to extend from the first position to the second position when the chip is received by the support apparatus.

3. The system of claim **1**, wherein the electronic processor is configured to control the temperature of a localized area of the chip by applying an electrical potential difference between the electrical terminals.

4. The system of claim **1**, further comprising a movable vacuum source extendible from a first vacuum position not in contact with the chip to a second vacuum position in contact with the chip when the chip is positioned on the support apparatus.

5. The system of claim **4**, wherein the electronic processor is configured to extend the vacuum source from the first vacuum position to the second vacuum position to form a fluid connection with a channel positioned in the chip.

6. The system of claim **1**, further comprising at least one extendible member electrically connected to the electronic processor and positioned so that when the chip is received by the support apparatus, the at least one extendible member contacts the chip and extends to deform a wall of a channel formed within the chip.

7. The system of claim **6**, wherein the electronic processor controls movement of the at least one extendible member between a first position where the at least one extendible member applies a first pressure to the channel wall, and a second position where the at least one extendible member applies a second pressure different from the first pressure to the channel wall, and wherein the electronic processor controls an open cross-sectional area of the channel by controlling the extension of the at least one extendible member.

8. The system of claim **1**, wherein the detector is configured to acquire an image of the chip when the chip is received by the support apparatus, and wherein the electronic processor is configured to determine the position of the chip and whether the chip is positioned correctly based on the image.

9. The system of claim **1**, further comprising a housing that encloses the support apparatus, the plurality of movable pins, the radiation source, the detector, and the electronic processor, the housing having an opening through which the chip can be received by the support apparatus, and a closing member adjustable between an open position wherein the opening is at least partially unobstructed by the closing member and a closed position wherein the closing member seals the opening.