CLAIMS

What is claimed is:

1. A method of detecting the presence or absence of a target nucleic acid in a sample, the method comprising:

    (a) providing a rotatable PCR disc comprising a closed loading chamber, a plurality of reaction chambers, a channel connecting the closed loading chamber to the plurality of reaction chambers, and an exit valve connecting the closed loading chamber to the channel, wherein the closed loading chamber contains the sample;

    (b) heating the sample in the closed loading chamber in a hyperbaric condition to a temperature above 100º C to produce a heat-treated sample;

    (c) opening the exit valve, thereby opening the closed loading chamber, and rotating the rotatable PCR disc such that the heat-treated sample flows to the plurality of reaction chambers via the channel; and

    (d) amplifying the target nucleic acid, if present, in the heat-treated sample in the plurality of reaction chambers.

2. The method of claim 1, wherein the sample is a bodily sample comprising the target nucleic acid, wherein:

    i) the bodily sample is selected from a blood sample, a lacrimal fluid sample, a saliva sample, a mucus sample, a sputum sample, a feces sample, a cerebrospinal fluid sample, and a urine sample; and

    ii) the target nucleic acid is not extracted, isolated, or otherwise purified from the bodily sample prior to the heating in (b).

3. The method of claim 1, wherein the sample comprises one or more reagents selected from: a chelating agent, a single stranded nucleic acid binding protein, a reducing agent, and a stabilizer.

4. The method of claim 3, wherein the sample comprises a chelating agent, a single stranded nucleic acid binding protein, and a reducing agent.

5. The method of claim 1, further comprising maintaining the sample at the temperature above 100º C for a maintenance time from about 5 seconds to about 120 seconds to produce the heat-treated sample, and subsequently cooling the heat-treated sample.

6. The method of claim 1, wherein the heating of the sample in the hyperbaric condition occurs at a temperature ramp rate of about 5° C per second to about 50° C per second.

7. The method of claim 1, wherein, in (a), the sample comprises a plurality of molecular amplification inhibitors, wherein the heating of the sample in the hyperbaric condition inactivates at least 60% of the plurality of molecular amplification inhibitors.

8. The method of claim 1, wherein, in (d), each of the plurality of reaction chambers comprises a PCR reaction mixture comprising a primer, a polymerase, and a plurality of nucleotides, and wherein (d) further comprises rotating the rotatable PCR disc to bring the plurality of reaction chambers adjacent to a first heating element, wherein the first heating element maintains the plurality of reaction chambers at a denaturing temperature of 90° C to 99° C.

9. The method of claim 8, wherein (d) further comprises rotating the rotatable PCR disc to bring the plurality of reaction chambers adjacent to a second heating element, wherein the second heating element maintains the plurality of reaction chambers at an annealing temperature of 50° C to 74° C.

10. The method of claim 1, wherein the heat-treated sample comprises the target nucleic acid, and wherein the method further comprises (e) detecting the target nucleic acid or an amplification product thereof.

11. The method of claim 10, wherein the target nucleic acid or the amplification product thereof is detectable after amplifying the target nucleic acid from 28 to 35 molecular amplification cycles.

12. The method of claim 10, wherein the method further comprises hybridizing a fluorescent probe to the target nucleic acid or the amplification product thereof, exposing the plurality of

reaction chambers to an excitation light, and detecting an emission wavelength corresponding to a presence of the target nucleic acid or the amplification product thereof.

13. The method of claim 1, further comprising, after (c) and prior to (d), heating and compressing the channel, thereby sealing the channel and preventing fluid communication between the plurality of reaction chambers.

14. The method of claim 1, wherein the heating in (b) comprises induction heating.

15. The method of claim 1, wherein the heat-treated sample comprises the target nucleic acid, wherein the target nucleic acid comprises RNA.