

A portable, real-time enzymatic amplification reactor with dry storage of reagents

Point-of-care diagnostic system for nucleic acid-based analysis

Inventor

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STATE OF DEVELOPMENT

Proof-of-concept prototype developed with testing of viral and bacterial nucleic acid targets

INTELLECTUAL PROPERTY

USSN [8,911,938](#)

USSN [9,409,166](#)

REFERENCE MEDIA

Qiu X. et al. [Lab on a Chip](#), 2010, 10(22), p. 3170-3177.

Kim J. et al. [Lab on a Chip](#), 2009, 9, p. 606-612.

APPLICATIONS

- Point-of-care diagnostics
- Lab-on-a-chip
- Integrated microfluidic systems
- Clinical, food safety, and environmental testing
- Detection of biological and bioterrorism agents

DESIRED PARTNERSHIP

License

Co-development

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Technology

The Bau lab has developed a pre-loaded analysis module with reagents stored within a barrier material capable of liberating the reagents at a desired time upon exposure to activation conditions. Reagents are first prepared in dried form and encapsulated with a protective layer, such as wax. The storage vessel can be a PCR chamber, as demonstrated in a lab study, or inserted into a fabricated enzymatic amplification chamber (PCR or isothermal). The encapsulation process ensures that lysis, washing, and elution steps that are carried out during enzymatic amplification (PCR or isothermal) do not affect the stored reagents. When the temperature reaches a certain threshold, the wax melts, automatically releasing the stored reagents.

In a related invention, the researchers have developed a lab-on-a-chip system, including the device structure and method of operation, integrating all of the PCR steps into one chamber, including cell lysis, nucleic acid isolation, concentration, purification, and amplification. This integration reduces sample loss, avoids cross-contamination during sample transfer, and minimizes sample degradation by preventing exposure to the surrounding environment. When combined with the reagent storage above, reagents are released at optimal reaction conditions, improving efficiency.

Advantages

- Automatic release of pre-stored reagents
- Reagents undisturbed through lysis, washing, or elution steps
- Hot start – reagents are not available until reactor's temperature has reached a desired level
- Accommodate range of reaction volumes
- Accurate temperature control
- Disposable, single use PCR chip at low cost

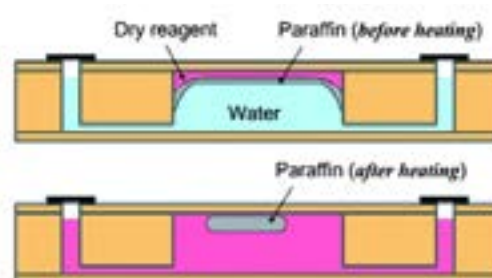


Image Caption: From Kim et al, 2009. Schematic of PCR reactor with dry storage of reagents.