

Disposable cassette to purify nucleic acids from biological samples for point-of-care diagnostics

Isothermal nucleic acid amplification reactor with integrated solid state membrane

Inventor

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STATE OF DEVELOPMENT

Proof-of-concept testing with HIV detection in non-clinical samples; prototype constructed

INTELLECTUAL PROPERTY

[USSN 9,476,102](#)

REFERENCE MEDIA

Liu C. et al. [Analyst](#), 2011, 136(10), p. 2069-2076.

Shih-Chuan L. et al. [Sensors and Actuators B](#), 2016, 229, p. 232-238.

Song, J. et al. [Analytical Chemistry](#), 2016, 88(14), p. 7289-7294.

APPLICATIONS

- Point-of-care diagnostics
- Environmental sample testing to monitor level of pathogens in food and water supplies
- Monitor level of infection in individuals

DESIRED PARTNERSHIP

License
Co-development

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Technology

Researchers in the Bau lab have developed a disposable microfluidic cassette with an integrated porous extraction flow-through membrane for purifying and concentrating nucleic acids from biological samples. The membrane allows decoupling the sample volume from the reaction volume, enabling relatively large samples to achieve high sensitivity, much greater than is typical for point of care devices. The purification step ensures that inhibitors that could interfere with nucleic acid amplification are removed from the sample. An external filament allows for temperature control of the isothermal LAMP-based (loop-mediated isothermal amplification) reaction. Products can be detected by monitoring the reaction in real-time with a portable fluorescent reader, a smartphone camera, or visually when a colorimetric dye is used. The utility of the device has been demonstrated by detecting the presence of HIV-1 in oral fluids with a limit of detection of 10 HIV particles.

Advantages

- High detection sensitivity
- Decoupling sample volume from reaction volume
- Portable, cost-effective device
- Readily adaptable to purify nucleic acids from pathogens in food, water, and bodily fluids
- Streamlined identification of genetic identity
- Integration of LAMP with sample-to-assay device
- Rapid detection of reaction products without need for thermocycler or expensive lab equipment

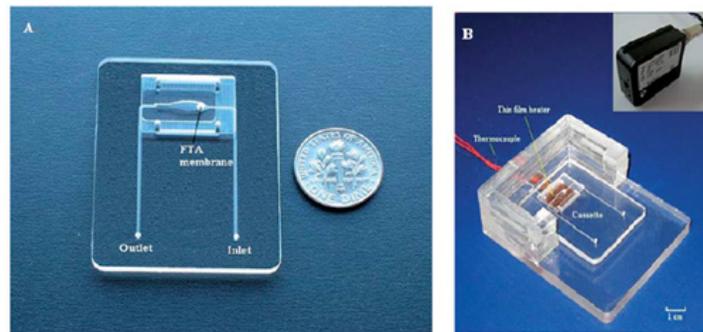


Image Caption: From Liu et al, 2011. In (A), a photograph of the single-chamber microfluidic cassette with an integrated membrane. In (B), the cassette holder is equipped with a thin film heater, a thermocouple, and a seat for the detector. The fluorescent signal is excited and detected with the portable ESE optical detector in the inset.