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Advancing the Arizona State University Knowledge Enterprise

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Quantitative, Multi-Target, Nucleic Acid Analysis Device

Loop-mediated isothermal amplification (LAMP) has great potential for sensitive and selective nucleic acid analysis in resource-limited settings. Amplifications can be easily observed via optical means such as colorimetry which combines robust performance and simple instrumentation. To date, microfluidic approaches based on colorimetric detection have not been reported, nor have multi-target and multi-replicate LAMP DNA/RNA analysis on a low cost device.

Researchers at the Biodesign Institute of Arizona State University have developed a novel device and method which use simple microfluidic handling approaches to analyze nucleic acids which can be observed with simple optical means such as colorimetry. This system allows for numerous reaction replicates to be performed or numerous reactions analyzing different analytical targets for one sample to be performed on a single low cost device. This system is useful for isothermal, 'one-pot' sensitive nucleic acid analysis in resource limited settings.

This technology enables low-cost, disposable microfluidic devices for nucleic acid presence/absence detection as well as nucleic acid quantification.

Potential Applications

- Sensitive nucleic acid analysis in resource limited settings
  - Instrument-free water quality assessment
  - Food-borne pathogen detection
  - Blood=borne disease detection

Benefits and Advantages

- Simple, optical detection of multiple simultaneous nucleic acid target concentrations in a digital quantitative format
- Multi-target LAMP DNA/RNA analysis on a low-manufacturing-cost device
- Multi-replicate on a single device
- Ease of manufacturing - device configurations are compatible with miniature machine-shop manufacturing capabilities
- Bubble-free liquid handling
- Presence/absence detection can be conducted to enable digitization of the concentration readout

For more information about the inventor(s) and their research, please see Dr. Meldrum's directory webpageDr. Meldrum's Biodesign directory webpage