Overcoming Challenges in On-Chip Molecular Detection: An innovative qPCR

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IMPORTANT TO KNOW...

The Holifood project aims to access the application of on-chip qPCR for detection of emerging pathogens in food. And to achieve this, we are exploring and understanding factors that influence the transfer of qPCR from traditional benchtop to on-chip technology.

Our strategy addresses four key aspects: applicability, specificity, sensitivity, and robustness.

CHALLENGES

- Microfluidics
  - Air-Trapping
  - Temperature Distribution
  - Reaction Volumes
- Surface Chemistry
  - Non-Specific Binding

ENVISIONED APPROACH

- Degassing Methods
- Advanced Channel Designs
- Use separate qPCR mix components
- Optimize Primer and Template
- Blocking Agents
- Surface Coatings

THE DESIGN

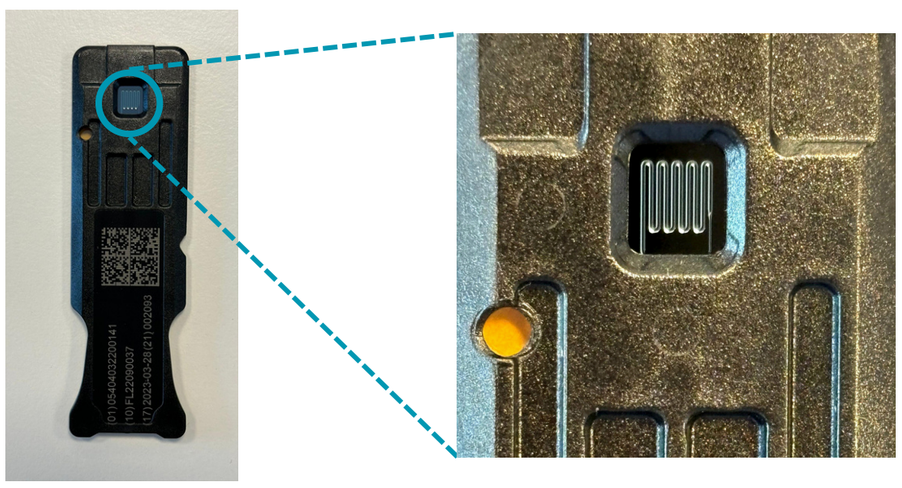

Fig. 1: Silicon chip's reaction chamber.

The qPCR reaction chambers on the silicon chip have a nominal depth of 250 µm, a width of 500 µm and a serpentine-shape design to overcome air trapping, resulting in a total reactor volume of 2.4 µL. Insulating trenches are carved around the reaction chambers to prevent unwanted heating of the chip during thermal cycling.

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