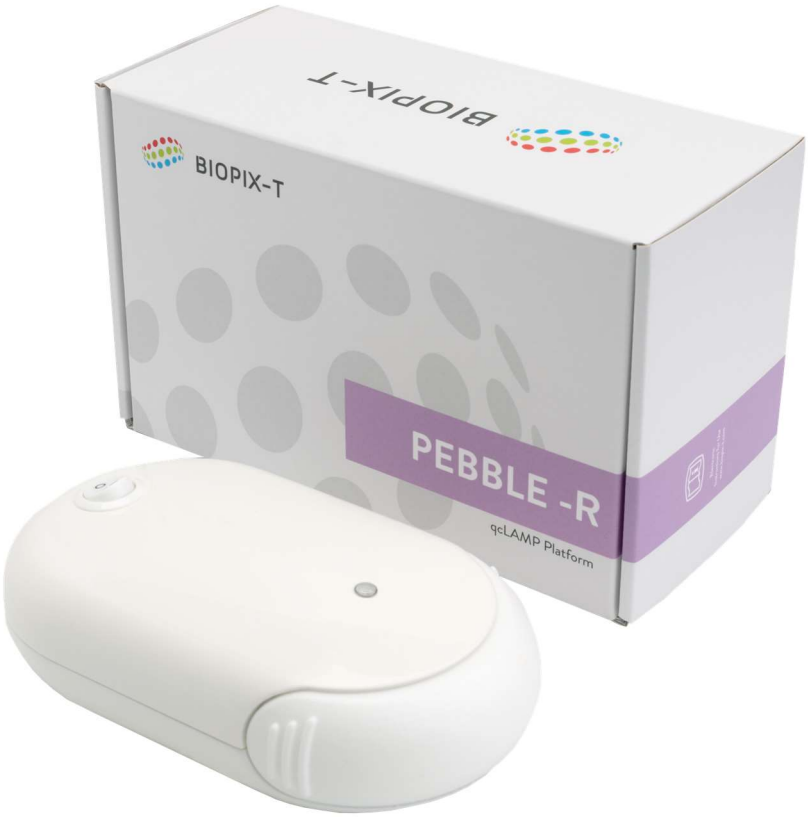
PEBBLE-R



What is the PEBBLE-R device?

PEBBLE-R is a **compact**, **portable**, **cost-effective**, **Research Use Only-(RUO) Platform** for nucleic acids amplification and detection using real-time quantitative colorimetric loop-meditated isothermal amplification (**qcLAMP**) [1].

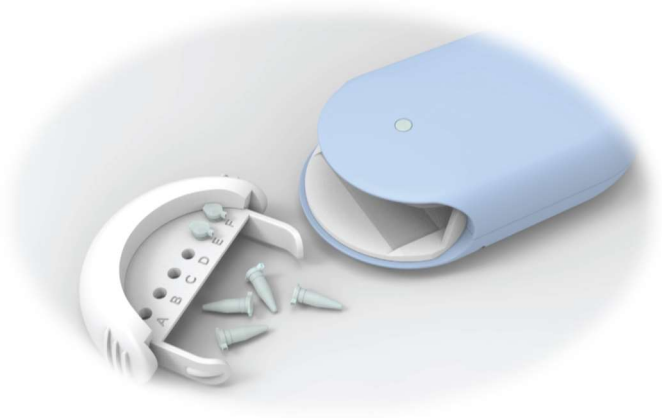
PEBBLE-R offers **flexibility** for research use with researcher's choice of reagents and settings.

Why the PEBBLE-R is unique?

- **Cost-effective** and **portable** device
- **Simple**, yet powerful alternative to expensive and bulky PCR methods
- **Flexible**: for the use with your own reagents and settings
- **Faster**: **real-time** colorimetric detection
- **Low-power consumption** for convenience

metabion international AG | Semmelweisstrasse 3 | 82152 Planegg/Steinkirchen | Germany
phone: +49 89 899 363 0 | fax: +49 89 899 363 11 | email: info@metabion.com | www.metabion.com

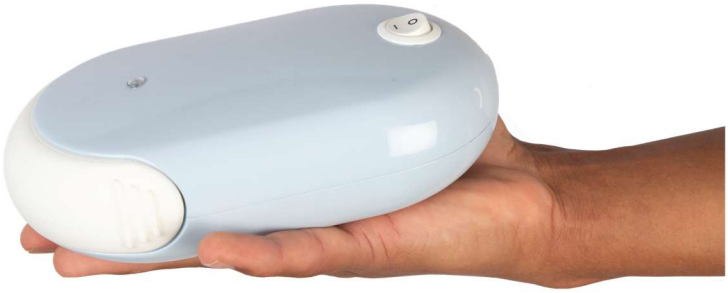
The PEBBLE-R qcLAMP (isothermal PCR) assays show **comparable sensitivity and specificity to traditional PCR methods** [2]. Tests are performed on the PEBBLE-R qcLAMP Platform, which controls the reaction temperature, timing and facilitates the real-time digital colorimetric analysis of the amplification reactions.



The device is constructed using miniaturized electronic components' cases and holders produced by three-dimensional (3D) additive manufacturing and operates via an in-house developed smartphone application. For monitoring the colour change during DNA amplification, a **novel way of heating** was introduced allowing efficient amplification with **parallel visualization** of the reaction by a **mini digital camera** controlled by a microcontroller [3]. The above, when combined with an application for **digital image analysis**, can **rapidly extract quantitative information** at a **wide dynamic range** of the genetic target [1].

The PEBBLE-R device uses **smartphone-based** colour analyses, enabling **simple, rapid, and reliable nucleic acid detection** without the need for expensive fluorescence equipment [1].

Compared to real-time quantitative polymerase chain reaction (RT-qPCR)-based methods, the PEBBLE-R RT-qcLAMP assays require incubation at a constant temperature (provided by the compact unit), thus **eliminating the need for sophisticated instrumentation** [1].



Main advantages of the PEBBLE-R[1]

- ✓ **Flexible** settings and usage based on the researcher's requirements, with a **choice of colorimetric dyes**.
- ✓ Comparable **sensitivity and specificity** to traditional PCR assays.
  - Quantification over a **large dynamic range** (9 log units).
  - Ability to use extracted **RNA or DNA** for increased sensitivity.
- ✓ **Detection** of nucleic acids **in crude samples** in a single test.
- ✓ Smartphone-operation - the device connects via **Bluetooth** to a smartphone or tablet and operates through an in-house developed **Android** application*.
- ✓ **User-friendly interface** for sending data to email or checking measurement history.

References:

1. Papadakis, G et al. Portable real-time colorimetric LAMP-device for rapid quantitative detection of nucleic acids in crude samples. May 27, 2021. bioRxiv preprint doi: https://doi.org/10.1101/2020.07.22.215251.
2. Notomi, T et al. Loop-mediated isothermal amplification of DNA. Nucleic Acids Research, 2000, Vol. 28, No.12.
3. Raspberry Pi is a series of small, inexpensive single-board computers developed in the United Kingdom by the Raspberry Pi Foundation in association with Broadcom. A low-cost Linux and ARM-based computer on a small circuit board sponsored by the charitable Raspberry Pi Foundation in the UK. "Raspberry Pi Foundation - About Us". https://www.raspberrypi.org/about/. Raspberry Pi. (Accessed 12/08/21).

* Cloud storage of results.

metabion international AG | Semmelweisstrasse 3 | 82152 Planegg/Steinkirchen | Germany
phone: +49 89 899 363 0 | fax: +49 89 899 363 11 | email: info@metabion.com | www.metabion.com