

NASA SBIR/STTR Technologies

E1.03-8342 – Rapid Multiplex Microbial Detector

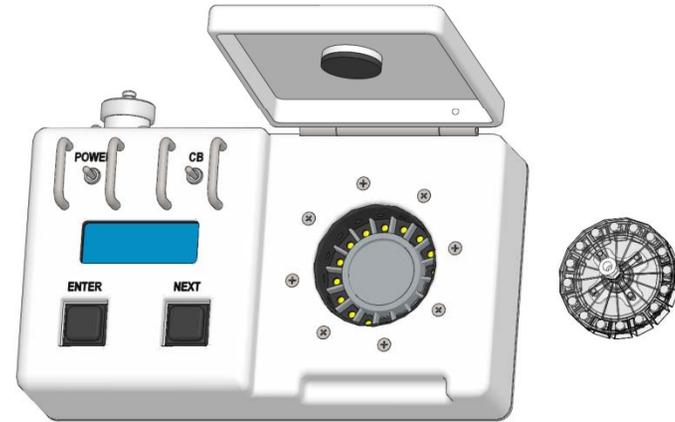
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Identification and Significance of Innovation

The Rapid Multiplex Microbial Detector (RMMD) is a rapid nucleic acid-based detector for spaceflight water systems to enable detection of multiple strains of microbes with minimal consumables and crew time. The RMMD amplifies the genetic sequences in specific microbes in a liquid sample to allow simultaneous near real-time identification of multiple waterborne pathogens. This easy-to-use device incorporates a patented polymerase enzyme that enables rapid RNA amplification by reagents with superior shelf life and thermal stability.



Expected TRL Range at the end of Contract (1-9): 4

Technical Objectives and Work Plan

The primary objective of the Phase 1 activity was to develop the chemistry and hardware designs for the Rapid Multiplex Microbial Detector and demonstrate prototype hardware functionality in a laboratory setting. We developed the appropriate chemical structures, and hardware configurations through design, analysis, and testing. To accomplish this objective we completed the following tasks:

- Determine which microbes will be detected
- Develop isothermal amplification chemistry
- Design, develop and test prototype detection chemistry
- Design and fabricate a benchtop prototype cartridge and processing chamber for performing rapid rRNA amplification and detection
- Test performance of the benchtop prototype hardware and software

NASA and Non-NASA Applications

The RMMD provides quantitative indication of the presence of multiple waterborne pathogenic bacteria and viruses simultaneously within 30 minutes of sampling, with minimal consumable hardware. If an infection is suspected in space, potential sources can be tested, and results determined quickly, so additional infections can be avoided. This technology can be used on the ISS and on future long-duration spaceflight missions.

The military can use RMMD for water testing in remote or resource limited environments for surface water quality testing for research and surveillance.

The RMMD approach provides the ability to quickly test potable water samples for real estate, new well, new construction applications, and the aquaculture industry.

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NON-PROPRIETARY DATA