

## REVOLUTIONARY DIAGNOSTICS – NONTRADITIONAL APPROACHES FOR DEVELOPING BREAKTHROUGH CAPABILITIES AGAINST EMERGING THREATS

### Rapid Testing And Validation Of Gene-based Sensors For The Detection Of Sars-cov-2

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The importance of the rapid development and deployment of detection and diagnostic devices in response to novel biological threats has been underscored by the global SARS-CoV-2 pandemic. Gene-based circuit detection of target nucleic acid sequences can be performed using cell-free protein expression systems and has been previously demonstrated for the detection of several biological threats. The use of cell-free systems ultimately enables the exploitation of biological mechanisms without the requirement to keep cells alive and thus enables the creation of a detection platform that is low burden and fieldable. In this work we report the independent validation of gene circuits for the detection of SARS-CoV-2 in a cell-free system. Sensor and primer information was conveyed electronically by our academic collaborators, assembled and amplified in-house and tested on paper-based cell-free tickets for proof of concept validation. We then sought to optimize conditions for the amplification and detection of genomic SARS-CoV-2 RNA. Future work will test this system for the extraction and detection of SARS-CoV-2 RNA in clinical patient samples. The establishment of this capability in our laboratories helps to poise the technology for the rapid response to unknown biological threats that may emerge in the future.