Accelerating COVID-19 Assay Preparation Using Parallel Evaporators

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On December 31st 2019, Chinese authorities notified the World Health Organization (WHO) of a pneumonia of unknown cause detected in Wuhan, Hubei province. It was later discovered to be a novel coronavirus, now termed SARS-Cov-2.

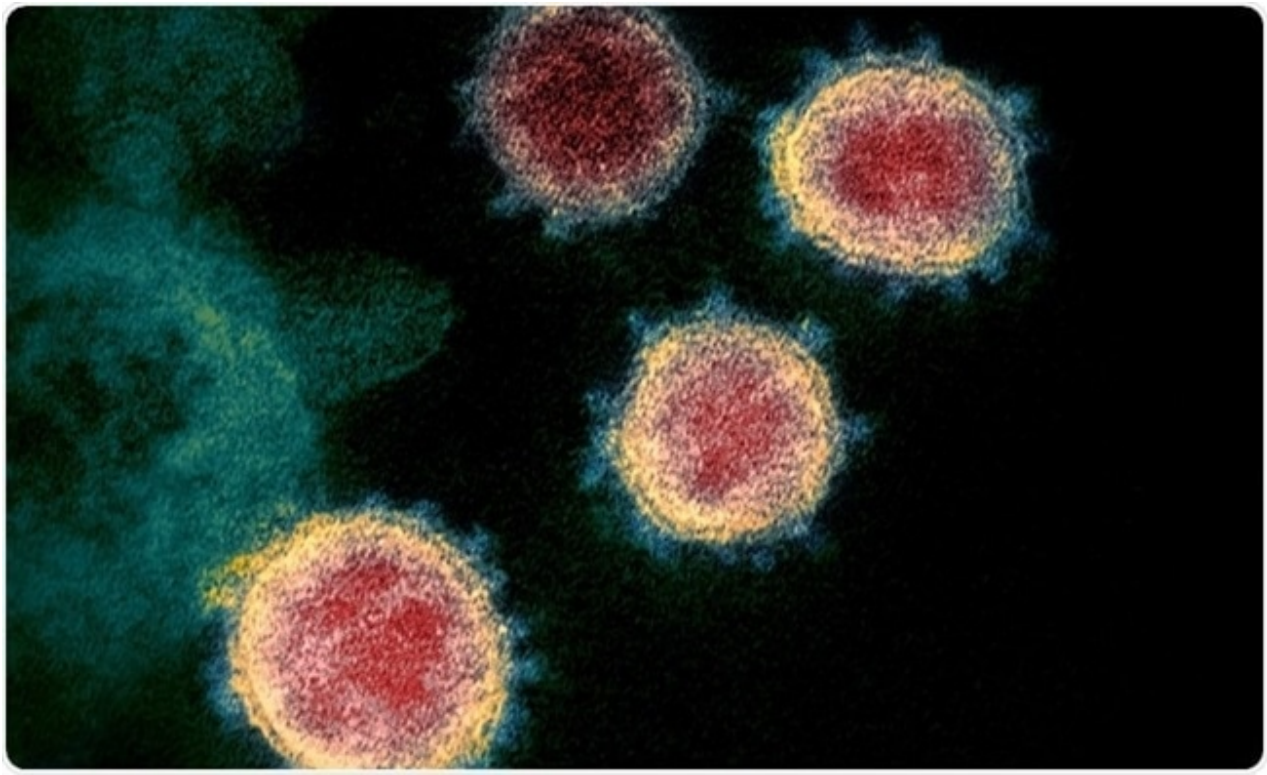

Image credit: NIAID-RML

The virus is composed of a single RNA strand and contains around 30,000 bases. Data shows that the majority of people infected experience mild symptoms, including a cough, fever, sore throat, and fatigue. However, a proportion of those infected goes on to develop more severe symptoms, including organ failure and pneumonia, which can be fatal.

At the time of publication, coronavirus disease 2019 (COVID-19) has now spread to 209 countries and provinces, and confirmed infections have surpassed 3.1 million worldwide. Governments around the world are currently working hard to minimize the impact of the virus.

In addition to stringent social distancing measures introduced in many countries, testing is critical to controlling the spread of the virus. If infected individuals can be identified, they and anyone else they have recently contacted can enter quarantine to prevent onward transmission.

The WHO has repeatedly emphasized the importance of testing: *"We have a simple message to all countries – test, test, test,"* said WHO Director General Tedros Adhanom Ghebreyesus at a news conference on March 16th 2020.

The success already seen in some countries at limiting their number of cases has been attributed to early and extensive implementation of testing, for example, in South Korea and Germany. However, other countries such as the USA and UK have been slower off the mark.

An issue for all countries now is how to obtain a sufficient supply of testing kits, when the international demand for them has never been higher.

PCR Testing for Coronavirus

PCR tests are used to directly detect the presence of an antigen, rather than the presence of the body's immune response, or antibodies. By detecting viral RNA, which will be present in the body before antibodies form or symptoms of the disease are present, the tests can show whether or not someone has the virus very early on.

The standard test for COVID-19 is based on a polymerase chain reaction (PCR). This looks for an active infection with the virus through a sample from a nasopharyngeal swab or sputum. PCR is extremely reliable, offering both high sensitivity and specificity. However, PCR tests can be very labour intensive, with several stages at which errors may occur between sampling and analysis. False negatives can occur up to 30% of the time with different PCR tests, meaning they are more useful for confirming the presence of infection than giving a patient the all-clear.

PCR test kits were rapidly available once the scientific community became aware of the novel coronavirus. In a testament to the advances of science, the genomic sequence was available within weeks of the initial outbreak being reported. By contrast, during the SARS outbreak of 2003, which was also

caused by a coronavirus, the genetic sequence was not determined for almost six months.

Before running a PCR test, the RNA in a virus has to be turned into a DNA copy. Then, the primers look for the target regions within a gene. If a target is present, these regions are copied over and over. Each time a copy is made of the target DNA, light will be emitted. If there is a lot of light, this indicates the presence of the genetic material that identifies the virus, meaning a person has tested positive for COVID-19.

Most kits have at least two primers as targets to improve the reliability of the result. These primers and probes play a crucial role in the PCR test kits and scaling up efficiently to meet the high demand is critical.

Various laboratories, companies, and public health authorities have used genomic information on the virus to design primers and probes for PCR. In the USA, where the Centers for Disease Control's testing kits proved faulty, the Food and Drug Administration (FDA) has since allowed companies and institutions to produce and distribute their own testing kits. So far, 28 companies have been approved to do so by the FDA.

As laboratories around the world scale up their production of PCR test kits to aid the global fight against the virus, improvements to the workflow for producing testing kits are urgently needed to increase the efficiency of test kit production.

In-built Evaporation Efficiency

SP-Genevac is a world-leading manufacturer of centrifugal evaporators. The company offers a range of parallel evaporators to suit various sample throughput and applications, including oligo synthesis and purification. There are many patented technologies built into these systems for sample protection.

The HT Series 3i evaporator range offers an ideal solution to improving the efficiency of test kit production, by preventing bottlenecks in high-throughput processing of oligonucleotides. It provides a fast and reliable method for drying primers and probes ready for use in PCR testing kits.

Image credit: SP Scientific

The range facilitates parallel evaporation and freeze-drying options and has the flexibility to accommodate a variety of sample formats, such as sample blocks for tubes and vials, one-piece holders for larger tubes, bottles and flask, and FastStack microplate holders. All evaporators in the range come in-built with Genevac's Dri-Pure anti-bumping sample protection. Additional reassurance comes from SampleGuard temperature control, which prevents samples from overheating when evaporation is complete.

This advanced technology is brought together in one sleek device that offers full customization through an intuitive, easy-to-use, touchscreen interface.

References and Further Reading

1. Boseley S & O'Carroll L (2020) *UK ministers struggle to keep promise of 100k coronavirus tests by end of April.* [Online] The Guardian. Available at: https://www.theguardian.com/world/2020/apr/03/uk-ministers-struggle-to-keep-promise-of-100k-coronavirus-tests-by-end-of-april Accessed: April 2020.

2. Farge E & Revill J (2020) *'Test, test, test': WHO chief's coronavirus message to world*. [Online] Reuters. Available at: https://uk.reuters.com/article/uk-healthcare-coronavirus-who/test-test-test-who-chiefs-coronavirus-message-to-world-idUKKBN21331G Accessed: April 2020.
3. Hollingsworth J (2020) *A coronavirus test can be developed in 24 hours. So why are some countries still struggling to diagnose?* [Online] CNN. Available at: https://edition.cnn.com/2020/03/24/asia/testing-coronavirus-science-intl-hnk/index.html Accessed: April 2020.
4. Lee A (2020) *Why we shouldn't pin our hopes on a coronavirus vaccine.* [Online] Wired. Available at: https://www.wired.co.uk/article/coronavirus-vaccine-china Accessed: April 2020.
5. Service RF (2020) *The standard coronavirus test, if available, works well—but can new diagnostics help in this pandemic?* [Online] ScienceMag. Available at: https://www.sciencemag.org/news/2020/03/standard-coronavirus-test-if-available-works-well-can-new-diagnostics-help-pandemic Accessed: April 2020.
6. US Food & Drug Administration (2020) *Emergency Use Authorizations.* [Online] FDA. Available at: https://www.fda.gov/medical-devices/emergency-situations-medical-devices/emergency-use-authorizations#covid19ivd Accessed: April 2020.
7. Verity R, Okell LC, Dorigatti I, et al. Estimates of the severity of coronavirus disease 2019: a model-based analysis. Lancet Infect Dis 2020; doi: 10.1016/ S1473-3099(20)30243-7. https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30243-7/fulltext
8. Worldometers (2020) *Coronavirus.* [Online] Worldometer. Available at: https://www.worldometers.info/coronavirus Accessed: April 2020.

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Last updated: May 13, 2020 at 3:26 AM

SP Scientific

Address

935 Mearns Road
Warminster
PA, 18974
United States

Phone: +1 (800) 523-2327

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