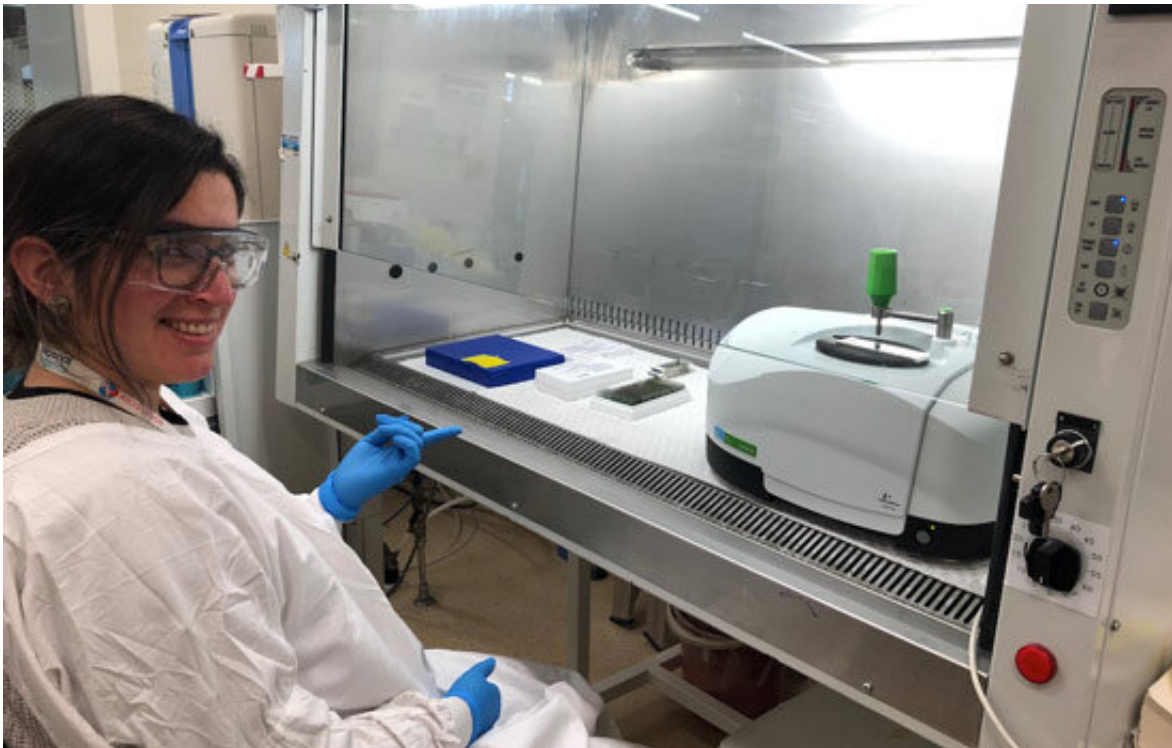


New research could pave the way for safer and more efficient COVID-19 testing

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Dr Natalia Salazar-Quiroz, formerly from the Doherty Institute and a co-author of the paper which outlines a proof of concept for a new, fast, portable saliva screening test. Credit: Professor Bayden Wood.

International research led by Monash University and the Peter Doherty Institute for Infection and Immunity has achieved a proof of concept for a new, fast, portable saliva screening test that uses an infrared light technology to confirm infection with SARS-CoV-2.

The research is published today in *Angewandte Chemie*.

Professor Bayden Wood, from the Monash University School of Chemistry, Dr. Phil Heraud formerly from the Monash Biomedicine Discovery Institute and collaborators Professors Dale Godfrey and Damian Purcell from the Doherty Institute, report on a new diagnostic approach, which involves the use of a portable infrared instrument to detect the SARS-CoV-2 virus in saliva.

The team identified a signature of the infectious agent in the infrared spectra of saliva from 27 out of the 29 SARS-CoV-2-infected human subjects who presented at The Royal Melbourne Hospital with COVID-19-like symptoms.

"The most significant advantages of using this infrared-based technology on saliva samples, include the speed and ease with which the test can be performed, its affordability and the [reduced risk](#) to both patients and healthcare workers," said Professor Wood.

The scientists say this is very encouraging preliminary research and are keen to see further testing with a larger patient cohort to better understand the specificity of this approach.

A portable infrared spectrometer was modified to enable high throughput screening enabling the samples to be rapidly scanned in a contactless mode without having to clean the instrument between measurements.

Professor Wood estimates that this technique could be capable of screening 5000 samples per day per instrument, with results for each [sample](#) being ready in five minutes.

Dr. Heraud said because the infrared light interacted with the vibrations

of molecules, it could be used to generate a spectrum that represented a unique chemical fingerprint of the sample that was then processed using machine learning algorithms.

"The approach has significant advantages over the standard Real Time Reverse Transcription Polymerase Chain Reaction (RT-PCR) that is the current gold standard for detection," said Professor Godfrey.

"As we know, this requires that samples are sent to a dedicated laboratory and results take a day or more".

According to Professor Purcell the proposed new test also avoids the discomfort associated with nasopharyngeal swabs, an advantage that could improve community participation in testing.

"A person can contribute the sample by simply dribbling into a sterile container," he said.

"The result can be derived in less than five minutes and a rapid result minimises the delay in determining if quarantine is required, therefore minimising the risk of further spread of infection."

A similar infrared technique known as Attenuated Total Reflectance (ATR) spectroscopy has previously been used by the Monash researchers to detect malaria and hepatitis.

The new transfection infrared based approach offers triple the absorbance and hence interrogates more saliva to detect pathogens compared to the traditional ATR technology.

The speed and versatility of the technique potentiates its use for point-of-care screening at airports, sporting venues, universities or schools, to triage patients for RT-PCR testing.

Although multiple techniques were used in validating the approach, Professor Bayden Wood carried out much of the initial work using the infrared microspectroscopy beamline at the Australian Synchrotron (AS), with support from the beamline team.

The measurements performed at the AS were recorded from highly purified clusters of virus, provided by the team at the Doherty Institute.

The unique infrared RNA signature from the SARS-CoV-2 virus was then detected in the infrared spectra of the [saliva samples](#) recorded using the portable instrument.

More information: Bayden Robert Wood et al, Infrared based saliva screening test for COVID-19, *Angewandte Chemie International Edition* (2021). [DOI: 10.1002/anie.202104453](https://doi.org/10.1002/anie.202104453)

Provided by Monash University

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