



Contribution ID: 170

Type: Oral

Synchrotron infrared characterisation of SARS-CoV-2 virions for a new COVID-19 saliva test

Friday, 26 November 2021 14:35 (15 minutes)

In response to the COVID-19 pandemic the Biospectroscopy group within the Monash School of Chemistry have become part of a research working group headed by Prof. Dale Godfrey and Prof. Damian Purcell at the Doherty Institute to develop a new IR diagnostic for the detection of COVID-19. An infrared-based test would be reagent-less, able to test hundreds of thousands using the same instrument, be highly sensitive and inexpensive, producing results in minutes. This is cogent especially given the worldwide shortage of conventional testing kits and the long delays in getting results that in the case of virulent variants such as Delta, are costing lives. The talk will focus on new developments in the arena of point-of-site COVID testing highlighting rapid diagnostic-based tests and our new infrared based saliva screening test. We have modified a portable infrared spectrometer with purpose-built transfection accessory for rapid point-of-care detection of COVID-19 markers in saliva. Initially, purified virion particles were characterized with Raman spectroscopy, synchrotron infrared (IR) and AFM-IR. A data set comprising 171 transfection infrared spectra from 29 patients testing positive for SARS-CoV-2 by RT-qPCR and 28 testing negative, was modeled using Monte Carlo Double Cross Validation with 50 randomized test and model sets. The testing sensitivity was 93 % (27/29) with a specificity of 82 % (23/28) that included positive samples on the limit of detection for RT-qPCR. This high throughput infrared COVID-19 test is rapid, inexpensive, portable and utilizes sample self-collection, thus minimizing the risk to healthcare workers and is ideally suited to mass or personalised screening in public and private settings.

Presenter Gender

Man

Do you wish to take part in the Student Poster Slam

Condition of submission

Yes

Students Only - Are you interested in AINSE student funding

Level of Expertise

Expert

Pronouns

They/Them

Which facility did you use for your research

Australian Synchrotron

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Session Classification: Biomedicine, Life science & Food Science

Track Classification: Biomedicine, Life science & Food Science