

APMP NEWSLETTER

Asia Pacific Metrology Programme

Activities of APMP Members
in Response to COVID-19



Focus Issue
October 2020



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National Measurement Institute (NMI), Australia

The National Measurement Institute, Australia (NMI), a division of the Australian Government Department of Industry, Science, Energy and Resources, is supporting the Australian Government's response to COVID-19 by developing crucial measurement and testing capabilities. These capabilities facilitate the development of new domestic manufacturing of critical products such as personal protective equipment (PPE), and underpin confidence in these products and testing to meet local requirements.

NMI has focused on three areas:

- Increasing the reliability of pathology test results: NMI and its collaborators have developed a viral reference material which can be used to confirm the accuracy of COVID-19 tests. Applications include patient diagnosis and monitoring for viral presence in wastewater.
- Building confidence in the quality of medical masks and respirators: Masks, including respirators, are a key component in the fight against COVID-19. The Australian Government has encouraged business to consider developing domestic PPE manufacturing, and local testing capability is especially important while production is being established. At the start of the pandemic, there were no accredited mask testing facilities in Australia. NMI is leading and coordinating national efforts in mask testing, including establishing an accredited reference laboratory capability for mask testing.
- Helping businesses design, manufacture and procure PPE and hand sanitisers: Ready access to basic PPE such as hand sanitisers is a simple but important step in enabling economic recovery. NMI offers Australia's only accredited testing service for alcohol-based hand sanitiser formulations, targeted at demonstrating compliance with WHO specifications. There has been significant service uptake by corporate consumers and consumer advocates.

NMI is providing expert advice in these and other areas to government, industry and the research community. NMI is also collaborating with our Quality Infrastructure (standards and conformance) partners, in particular NATA and Standards Australia, to develop guidance on Australian PPE testing procedures and laboratory capabilities, as well as reviewing relevant documentary standards.

Information on NMI's COVID-19 activities can also be found at: <https://www.industry.gov.au/news-media/covid-19-news/national-measurement-institute-helping-industry-respond-to-covid-19>

For further information, please contact:

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NMI scientist testing mask

National Institute of Metrology (NIM), China

1. Development and distribution of CRMs for SARS-CoV-2 testing

NIM developed two categories of CRMs, SARS-CoV-2 RNA reference materials and SARS-CoV-2 immunoassay reference materials for virus testing. These CRMs have been provided to test kit manufacturers and research institutes, with a view to validate their self-developed testing methods, provide metrological traceability to their own reference samples to meet the requirements for medical device registration, and guarantee the comparability of test results from different enterprises. These CRMs have also been used by hospitals for quality control of clinical testing and by provincial CDCs to assess the proficiency of their central laboratories as well as hospital laboratories in an effective way.



SARS-CoV-2 RNA reference materials

SARS-CoV-2 immunoassay reference materials

Please click <https://en.nim.ac.cn/node/660> for the full article and contact persons.

2. Calibration of infrared thermometers in response to COVID-19

Since the coronavirus outbreak in China, NIM has been making consistent efforts in addressing problems regarding the calibration of infrared thermometers (IRTs).

- Firstly, NIM developed a batch of portable blackbodies for calibration of infrared thermometers (PBCIRTs) and calibration systems for infrared clinical thermometers (CSIRCTs).
- Secondly, NIM developed an accuracy checking method for IRFTs using a verified clinical thermometer as a reference. This method can only be used as a temporary emergency checking solution for IRFTs when blackbodies are unavailable.
- Thirdly, NIM provided various training in operation and calibration of IRTs for technicians in basic-level metrology institutes/laboratories.
- Fourthly, experts from NIM and related research

institutes set up a traceability system for body temperature measurement for epidemic control etc., to the State Administration for Market Regulation (SAMR), the national metrology authority of China.

Please click <https://en.nim.ac.cn/node/660> for the full article and contact persons.

3. Webinar on Infrared Thermometers

NIM, under the umbrella of APMP Technical Committee of Thermometry (TCT), held a Webinar on Infrared Thermometers on July 8, 2020, which was designed for exchanging ideas and experience to promote the research and international cooperation on IRTs and better use infrared thermometry for COVID-19 public health challenge. Hosted by Dr. Inseok Yang, Chair of APMP TCT, this webinar invited five scientists from APMP member institutes, including NPL (UK), PTB (Germany), NMC/A*STAR (Singapore) and NIM (China), to share knowledge on challenges of using IRTs in public health, fundamentals of radiation thermometry, international comparisons of blackbodies for IRTs, calibration and application of IRTs, etc. More than 270 people from about 80 economies across 5 continents attended the webinar.

Please click <https://en.nim.ac.cn/taxonomy/term/251> for presentations.



A Calibration System for Infrared Clinical Thermometers (Left) and a Portable Blackbody for Calibration of Infrared Thermometers (Right) at the NIM, China

Center for Measurement Standards (CMS/ITRI), Chinese Taipei

1. Clinical Thermometer Calibrator

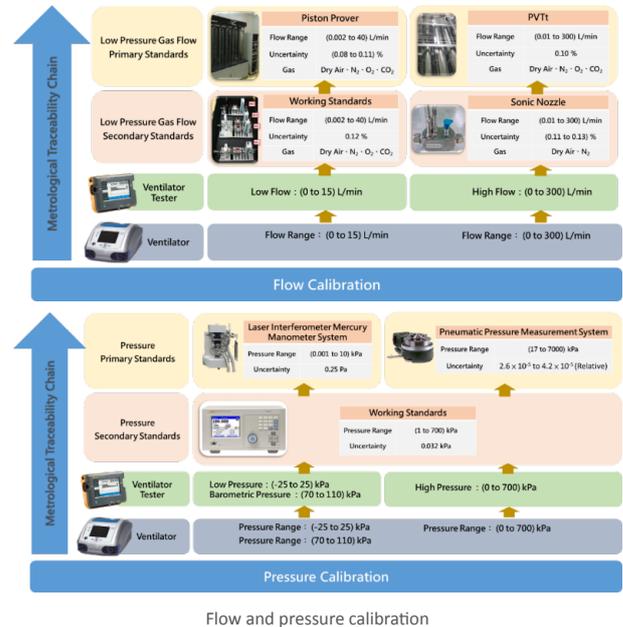
Since the severe acute respiratory syndrome (SARS) epidemic in 2003, CMS/ITRI has developed the clinical thermometer calibrator to provide the temperature standard for measurement devices, such as the ear thermometer. The calibrator is portable and can be widely deployed for the on-site calibration in hospitals, schools, supermarkets, offices, and any place requiring temperature inspection. Serial products of clinical thermometer calibration have been assisting the temperature control of preventive medicine through 2003 SARS, 2009 Influenza A virus subtype H1N1, 2012 Middle East Respiratory Syndrome Coronavirus (MERS-CoV), 2013 Influenza A virus subtype H7N9, and now the Coronavirus Disease 2019 (COVID-19). CMS/ITRI will continuously provide the calibrating applications for the front line of epidemic prevention.



The clinical thermometer calibrator

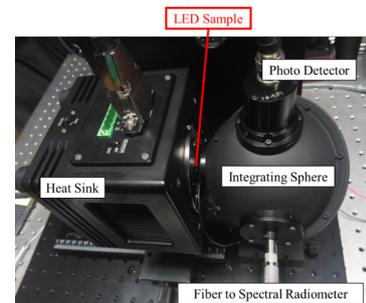
2. Calibration for Flow and Pressure of Ventilator

One of the key resources to fight COVID-19 is the medical ventilator. To achieve rapid mass production of ventilator with acceptable quality, the performance, such as the sensors of flow and pressure channels, requires professional validation and calibration to assure the accuracy. CMS/ITRI has developed the primary standards of flow and pressure, and is capable of providing measurement service to the supply chain of ventilators.



3. Measurement System for Key Parameters of Ultra-violet (UV) Light-Emitting Diode (LED)

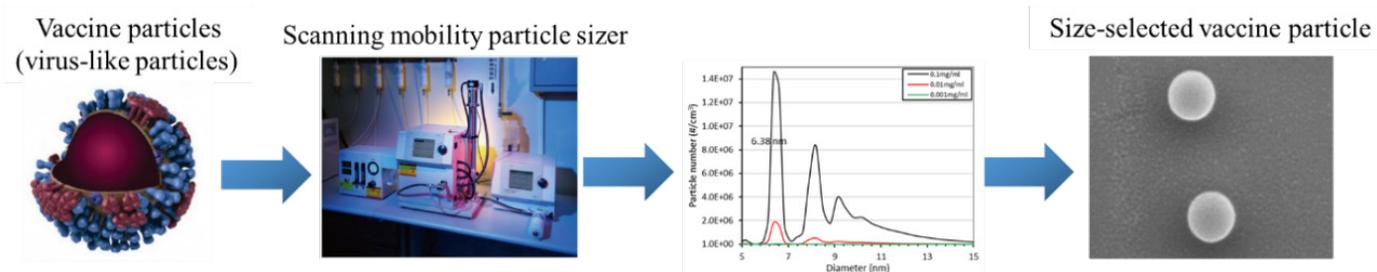
UV-C LED has been applied for sterilization and disinfection, and the related products have become even more popular during the pandemic of COVID-19. CMS/ITRI has established the measurement system for UV LED key parameters, such as radiant flux, irradiance, peak wavelength, spectrum, radiant intensity distribution, spectral irradiance, etc., to assist manufacturers in assuring the quality of products. With the traceability through the detector spectral responsivity standard to the cryogenic radiometer, the system can provide sufficient service to meet the industrial demands.



The measurement system for key parameters of UV LED

4. Gas-phase Scanning Mobility Particle Sizer for Virus-like Particles

Due to the outbreak of COVID-19, the development of vaccines is an urgent task, and the demands of analyzing the physical characterization of viruses and their derivatives rapidly are increased. Conventional methods for size and concentration analysis of viruses and their derivatives, such as polymerase chain reaction (PCR) and electron microscopy, are costly and time-consuming. CMS/ITRI has developed the gas-phase scanning mobility particle sizer (SMPS), which can provide size distribution with the precision from nanometer to sub-nanometer. Through this technique, the analysis of virus-like particles (VLPs) can be completed in less than an hour.



Please click

https://www.bipm.org/utis/common/pdf/COVID-19-repository/CMS_ITRI_summary.pdf to download the full article.

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CSIR-National Physical Laboratory (CSIR-NPL), India

In order to face the challenges due to COVID-19, the CSIR-NPL has also taken initiatives and has developed some state of the art testing facilities for Personal Protective Equipment (PPE). It has made special efforts to provide testing and calibration facilities for various parameters / instruments in order to enhance the corona testing capabilities of India. It is supporting Biomedical Laboratories, providing certification services of Infrared (IR) Thermometers, Blood Pressure Measuring Instruments, calibration of Ventilator Testers, Gas Flow Analyzers, Infusion Device Analyzers, Infusion Pumps, Defibrillators, etc.

CSIR-NPL facilities were made available day and night to provide traceability for the laboratories involved in testing of PPE and medical devices and manufacturing of drugs like Hydroxychloroquine and paracetamol (PCM). Some of the major clients were Ordinance Factories, Godrej Biomedical, IPCA, Zydus and Ajanta Pharma. Both these medicines have been in huge demand world over. During pandemic, > 1000 test and calibration certificates were issued. It has also issued 35 model approval certificates out of the total 44 applications received as support for several Indian firms for IR Forehead Thermometers.

CSIR-NPL in association with industry, has developed an equipment "A microbial disinfection casket" for the low-level surface disinfection of non-porous equipment surfaces after manual cleaning by dose-controlled UV irradiation. Efforts have been made to develop facilities for testing of Face-shield and Blood pressure measuring instruments. The development of testing facilities for model approved of BP measuring instruments is in advance stage. It has also initiated the process for developing testing facility for the IR Thermal Imagers/Scanners, development of Oxygen Concentrator and Ventilators.

Also contributing hugely in various committees of Bureau of India Standards (BIS), National Accreditation Board of Testing and Calibration Laboratories (NABL), Legal Metrology for the preparation of documentary standards, technical specifications, assessment etc. at various level.



Testing Facilities for PPE
Left-Water Vapour Transmissions Test, Middle-Particle Efficiency test, Right-Hydrostatic resistance test

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National Metrology Institute (NMIJ/AIST), Japan

Due to the COVID-19 pandemic, NMIJ/AIST has reduced the attendance rate of personnel working within our campus down to 20% according to governmental orders, both national and regional. Even in such extreme circumstances, however, NMIJ is mainly working on the following two services related to quality management and daily life of the citizens as social contribution activities to take measures against the COVID-19.

1. Never stop – Keep it going

Under our domestic law “Measurement Act”, we have mandatory chapters such as definition of measurement units and those for Legal Metrology, as well as an optional chapter related to the traceability and dissemination scheme of measurement standards with the designation of NMIJ as the National Metrology Institute. We have sophisticatedly planned our working plans for each individual and applied telecommunication technologies enabling work outside the campus. As a result, we have successfully managed to minimize the delay and conduct all of our activities under the “Measurement Act” except for those inspections under Legal Metrology requiring travel outside our campus. For those delayed activities, we are in deep communication with our Ministry to minimize the impact to daily life of our citizens and industry. NMIJ will continue to work for providing high quality services for metrology.

2. Learn about Metrology - at home

—Establishment of the website “Anyone from children to adults can learn”
—Due to the COVID-19 outbreak, people are requested to stay inside and even schools are now closed. Given the situation, NMIJ has developed a site that provides information to help make the “Stay-at-home order” a bit more enjoyable. NMIJ selected some contents from NMIJ website, including some introductory videos that are related to the SI and technical developments of NMIJ. This website will also introduce some experiments and crafting using measurement (“hakaru” in Japanese) and many other contents that will allow anyone to learn about “metrology” and “measure” in a fun, amusing way.

For more information, please click

https://www.bipm.org/utils/common/pdf/COVID-19-repository/NMIJ_summary.pdf.

National Institute of Communications and Technology (NICT), Japan

The National Institute of Communications and Technology (hereafter NICT) has established COVID-19 control headquarters and its own guidelines as follows.

1. In order to reduce the number of employees working in the same office, we divided them to two teams and the teams do teleworking every other day.
2. Meetings at NICT shall be conducted in principle using web meetings or e-mail, etc..
3. Open the windows at least twice an hour for ventilation.
4. Equip hand sanitizer in each office.
5. Minimize the use of experimental facilities and equipment and perform data analysis etc. at home.
6. To avoid close contact, carefully plan the operation of experimental facility or apparatus.
7. If an employee is notified of the close contact to a COVID-19 infected persons, he or she is required to stay home for 14 days from the date of the last contact with the infected person.
8. Refrain from attending work when there is a symptom of cold such as fever or cough.
9. Having visitors is discouraged.
10. Business trips from Tokyo to the branches in other prefectures is discouraged, except for the case that the director in charge permits beforehand.
11. Overseas business trips (including exhibitions) will not be encouraged for the time being in principle.
12. Research exchanges will be conducted through alternative ways (web conference, email, etc.).
13. Actual training and lectures must behold at the minimum necessary, holding by utilizing web conferences, and e-learning is prioritized.
14. No social gatherings (welcome parties, farewell parties, etc.)

For general inquiries; https://www.nict.go.jp/en/COVID-19_of_index.html

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Korea Research Institute of Standards and Science (KRISS), Republic of Korea

1. R&D

KRISS is doing its utmost to contribute to the resolution of the COVID-19 pandemic through R&D. We are developing a set of reference materials related to COVID-19. Recently we released the KRISS SARS-CoV-2 RNA reference material for nucleic acid based diagnosis in July. This RNA RM will be useful to validate commercial diagnostic kits and evaluate newly developed technologies for COVID-19 diagnosis. We are also actively working on expanding the COVID-19 related research, such as developing virus like particle and antigen-antibody reference materials.

2. Management

KRISS is taking various actions in accordance with the government's policies against the spread of COVID-19. Above all, KRISS organized 'COVID-19 Emergency Response Task Force' with Vice President as its chairman and the situation reports are made on a daily basis. As a part of our strong social distancing policy, we are restricting the number of non-essential visitors and minimizing direct contact such as business trips and meetings. Work-From-Home shifts are being implemented with each office having 25~50% of its member at office. Also, we are restricting the use of facilities that involve multiple employees gathering, such as fitness center, gym, café, etc. Moreover, KRISS is running a weekly disinfection of the whole institute and a daily disinfection of areas that come in contact with human hands such as door handles.



3. Supports for Industries

KRISS is supporting industries, especially SMEs which are struggling due to COVID-19. We are offering 50% reduction in costs for calibration/testing services for SMEs and 70% reduction in monthly rental fees for six companies located within the institute. In addition, we are working to attenuate the burden of SMEs through various methods, such as transferring technology to SMEs' researchers and subsidizing a portion of personnel costs through KRISS funding.

For more information, please click

https://www.bipm.org/utis/common/pdf/COVID-19-repository/KRISS_response_program.pdf

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National Metrology Center (NMC), A*STAR, Singapore

1. Infrared Clinical Thermometers and Thermal Imagers

Since the outbreak of COVID-19, infrared clinical forehead thermometers and thermal imagers are commonly deployed for fever screening to help identify those unwell. A*STAR's NMC supported local agencies on evaluating their newly developed non-contact human body temperature screening systems using infrared clinical thermometers and thermal imagers integrated with data analytics technology. The evaluations were instrumental in enabling public agencies to quickly roll out more than 500 sets of the screening systems for deployment in community clubs, office buildings, elders' homes and senior activity centres.

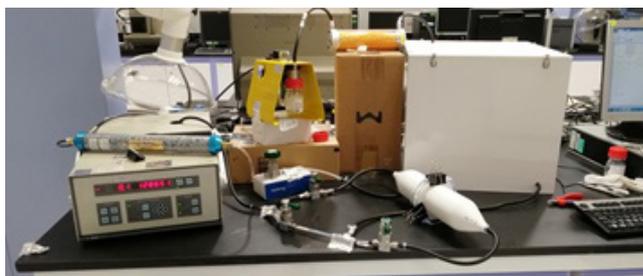
NMC also contributed to the revision of Singapore Standard 582: 2020 (SS582) "Thermal Imagers for Human Temperature Screening", which was completed in June 2020. SS582 specifies critical parameters and test methods to determine the suitability of a thermal imager for human temperature screening, as well as the method of deploying such devices for effective screening operation. The revised SS582 is an updated version of the former Singapore Technical Reference 15: 2003/2004 (TR15), which was developed in response to the outbreak of SARS pandemic in 2003. NMC has also set up a full suite of capabilities for the calibration of infrared clinical thermometers and testing of thermal imagers in accordance with SS582.



2. Face Masks

The rapid spread of COVID-19 has resulted in high demand for face masks across many countries. To ensure that there are sufficient face masks for frontline healthcare workers, patients and the Singapore public, A*STAR carried out R&D on reusable face masks and mask materials, and NMC has worked with other A*STAR research institutes in providing test services for developing mask products. Two of the test services based on international standards – differential pressure test for breathability, and particle filtration efficiency test for filtering effectiveness – were set up using NMC's pressure, flow and aerosol metrology capabilities. The test methods were based on relevant

international standards including ASTM F2299 and EN 14683. The test services contributed to the development of reusable face masks, as well as increased supplies of face masks produced locally and overseas.



3. Germicidal Ultraviolet Radiation Measurement

NMC is collaborating with other A*STAR research institutes to study the accuracy of dosage of germicidal ultraviolet (GUV) irradiation, which is a sterilization method that uses ultraviolet light at sufficiently short wavelength (200 nm to 280 nm) to break down micro-organisms. NMC provides the measurement expertise for

accurate and traceable measurement of GUV irradiation to improve its safety and efficiency with reliable measurement data.

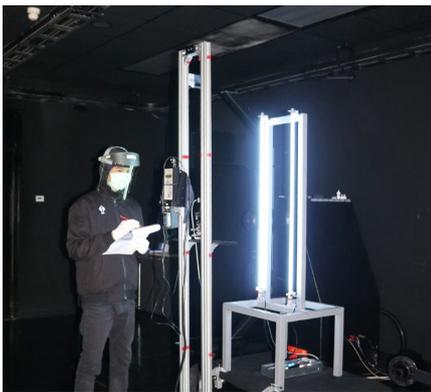
Contact

Dr Lim Ee Meng

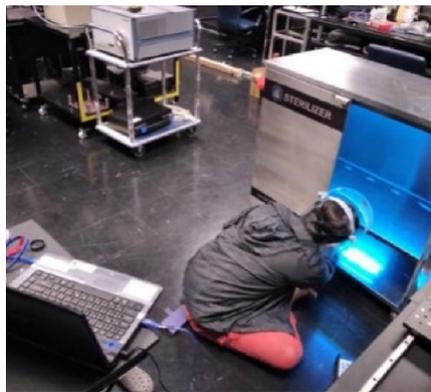
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National Institute of Metrology (NIMT), Thailand

During the spread of COVID-19 in Thailand, National Institute of Metrology (Thailand) (NIMT), despite not being a medical and public health expert, was trying to utilise expertise in measurement to provide scientifically sound procedures and tools to examine whether facemasks and PPE suits that were donated to hospitals are good enough for medical personnel working at frontiers as well as applying metrological knowledge to repurpose household equipment like microwave ovens to disinfect personal belongings of medical personnel to give them confidence and peace of mind. At the same time, there is cooperation with oversea competent agencies in the study of the RNA of SAR-CoV-2 to assist methodological standardization and confidence in global testing of the virus.



Measurement of UVC intensity at various coordinates around the prototype of UVC-germicidal Robot to determine appropriate exposure time.



Measurement of UVC intensity for determination of appropriate time period needed to effectively kill most micro-organism including COVID-19



Development of sterilisers for Thammasat University Field Hospital

Steriliser (wing type) using 4 UVC tubes in vertical and 4 UVC tubes in horizontal, eradicating germs in a 3x3 sq.m area within 8 minutes



Building a standard tool to test medical thermometers



Ensuring confidence in Ventilator Tester



Verification kit to test PPE suites



Inter-laboratory SARS-CoV-2 comparison using Digital PCR

For more information, please click <http://en.nimt.or.th> and www.bangkokpost.com/sp/nimt

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Kazakhstan Institute of Metrology (KazInMetr), Kazakhstan

(Associate member of APMP)

Kazakhstan Institute of Metrology (KazInMetr) is being the scientific metrology center, made contribution for grapple against COVID-19 pandemic, providing testing and calibration of measuring instruments for medical purpose.

Calibration of infrared thermometers is conducted by KazInMetr that widely used in health care. Calibration of infrared thermometers is carried out on liquid thermostat installing by transducer with resistance temperature device Pt100. This method allows to improve transmission accuracy size of a unit. Therefore, sample of transducer is made and transmission technique of unit is proved during measurements of different types of infrared thermometers including comparative measurement in humans.



a – transducer is installed in thermostat

b – transducer

Ministry of trade and integration of the Republic of Kazakhstan in cooperation with Ministry of Health have been developed instruction manual for infrared thermometers to publish in mass communication. Instruction manual allows to perform measurements of body heat for preliminary screening at large gatherings of citizens.

During quarantine procedure of certification and issue of measuring instruments for medical purpose have been simplified, extended duration of validity of pattern approval certificate, verification (calibration) certificate, due to expiration of validity in the period of emergency conditions (quarantine).

For more information, please click <https://kazinmetr.kz/news/o-primenenii-etalonov-i-sredstv-izmereniy-srok-deystviya-sertifikatov-o-poverke-kalibrovke-kotorykh-/>.

People working in KazInMetr keep mask requirement and social distance, provide acceptance and processing of applications in online, in order to exclude contact with people.

To ensure valid measurement results KazInMetr conducts testing of belt ventilator which used in medical settings.

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National Physical Laboratory (NPL), United Kingdom

(Associate member of APMP)

NPL is the UK's national laboratory for measurement science and metrology. It provides the measurement standards for all science, technology and manufacturing and was therefore uniquely placed to support the unprecedented challenge of the COVID-19 global pandemic. NPL has proved itself agile and responsive offering advice on standards, testing and product requirements, through to training and NPL staff deployment.

As a national laboratory which has hundreds of customers in the UK and beyond, it was a natural progression to make its expertise and facilities available to support UK industry. However, the role has extended further to work with National Health Service trusts on ventilator provision, oxygen supply and data processing and analysis. NPL performed tests to help verify and validate performance of materials, instruments, and sensors and used our state-of-the-art machines, tools and 3D printing capability to make prototypes and new products.

As the immediate focus on ventilators and emergency responses passed, NPL has focused attention on supporting UK industry with their needs for recovery. We have vast knowledge in standards which means we can provide advice on how supply chain changes and product modifications can impact compliance with regulations. NPL's extensive professional networks were used to link organisations with specialist suppliers to meet manufacturing challenges. The current global pandemic reminds us of the vital role that metrology plays in supporting global measurement systems and helping society function.

For more information, please click <https://www.npl.co.uk/covid-response>

Images of prototypes of PocketVent ventilator:



Contact

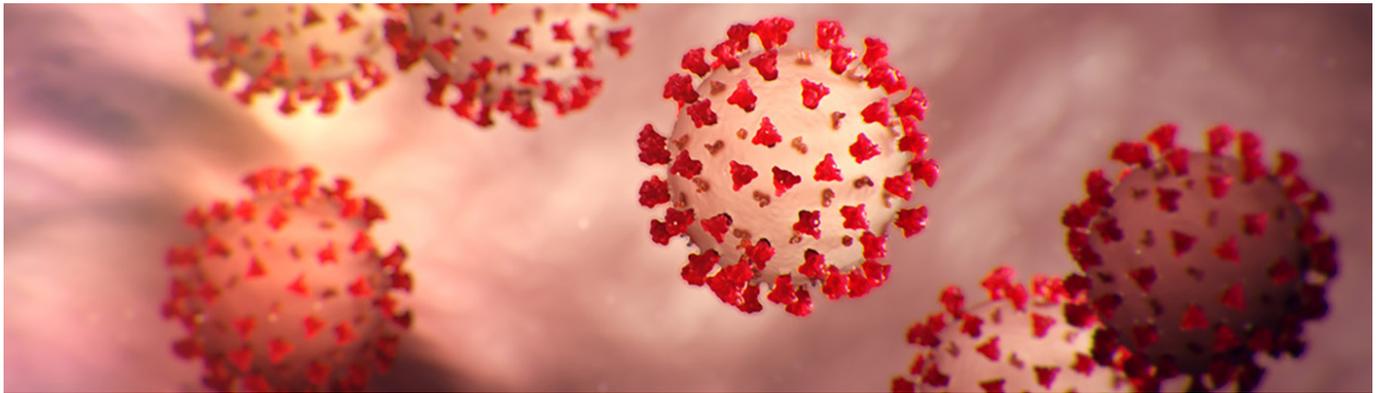
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National Institute of Standards and Technology (NIST), United States

(Associate member of APMP)



The National Institute of Standards and Technology (NIST) has several research projects underway to support efforts to address the COVID-19 pandemic. These projects are in several areas such as biological measurements, machine learning/artificial intelligence, data and analytics, personal protective equipment, manufacturing and industry, ventilators, wireless innovators, energy and environment, and technology transfer. One approach of interest to diagnostic testing for COVID-19 involves detecting the RNA (genetic material) of the SARS-CoV-2 virus in a nasal swab. Manufacturers of test kits need a way to measure how effective their tests are at detecting this RNA. To help with this, NIST has produced [synthetic fragments of SARS-CoV-2 RNA](#) that manufacturers can use to calibrate their instruments and develop quality controls.

Of interest to APMP, NIST is co-organizing a pilot study with three other National Metrology Institutes through the International Bureau of Weights and Measures (BIPM) CCQM Nucleic Acid Working Group. This pilot study will expand measurement capabilities and help standardize the performance of analytical methods used by diagnostic test manufacturers, clinical laboratory-developed tests and international test standardization efforts. For an overview of each research project and to read more about NIST news releases, please go to <https://www.nist.gov/coronavirus>.

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