

Lab+Life SCIENTIST

BOOSTING HEAT TOLERANCE IN WHEAT

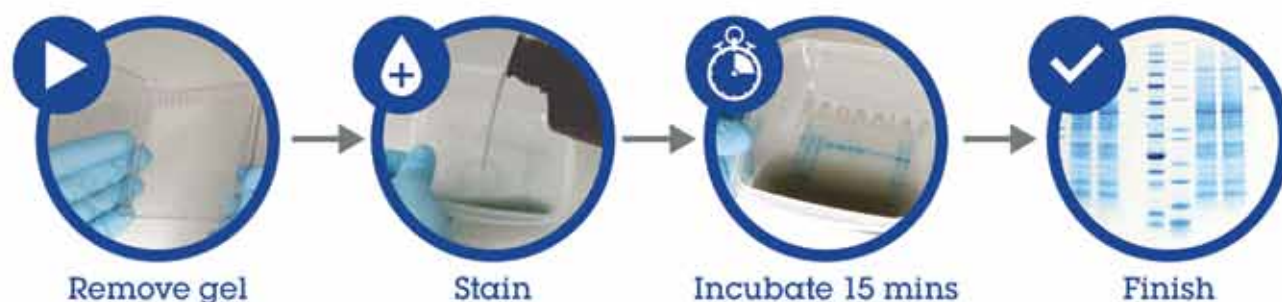
LAB-CREATED
HEART VALVES

BETTER
DOPING
DETECTION

JUN/JUL 2021
VOL. 32 NO. 2
ISSN 10030867

ANALYTICAL | BIOTECH | ENVIRONMENTAL | INDUSTRIAL | LIFE SCIENCES | MEDICAL

One step, ultra fast InstantBlue® Coomassie Protein Stain at Abcam now!



InstantBlue® Coomassie Protein Stain (ISB1L) (ab119211)

Easy-to-use, sensitive, non-toxic, allowing Coomassie protein staining for polyacrylamide gels with low background in 15 minutes.

Expedeon proteomics and immunology are now part of Abcam. All products are available at www.abcam.com



View datasheet
(ab119211)

Comparison with other Coomassie stains

	InstantBlue® Abcam	Stain S Brand T	Stain G Brand T	Home-made
No need to wash before staining	✓	3 x 5 mins	3 x 5 mins	Typ. 3 x 5 mins
No need to fix before staining	✓	✓	✗	✗
No need to heat / microwave	✓	✗	✓	✓
No need to destain	✓	✗	✗	✗
No risk of over-staining if left too long	✓	✗	✗	✗
Non-toxic and easily disposed of	✓	✓	✗	✗

Abcam Australia and New Zealand

AU Phone: 1800 960 553 Ordering: au.orders@abcam.com
 NZ Phone: 0800 758 929 Ordering: nz.orders@abcam.com

Technical: au.technical@abcam.com
 Technical: nz.technical@abcam.com

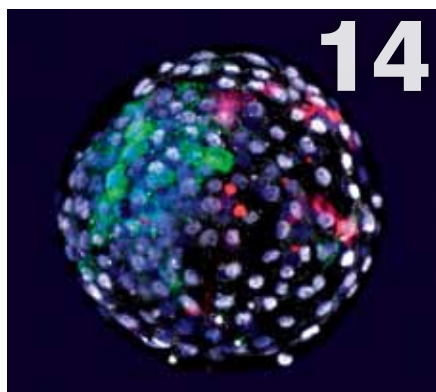
Contents



6

6 ONE STEP CLOSER TO A 100% DIGITAL LABORATORY

When Bumrungrad International Hospital first went live with the InterSystems TrakCare electronic medical record system, its clinical laboratory took a huge leap forward.



14

14 RESEARCHERS CREATE HUMAN-MONKEY CHIMERIC EMBRYOS

Scientists have injected human stem cells into primate embryos and were able to grow chimeric embryos for up to 19 days.



23

23 LAB-CREATED HEART VALVES GROW WITH THE RECIPIENT

Lab-created heart valves implanted in young lambs were capable of growth within the recipient; this could prevent the need for repeated valve replacement surgeries in children.



35

16 NEW TECHNIQUE FOR BETTER DOPING DETECTION

US scientists report the use of ion mobility-mass spectrometry to help regulatory agencies detect existing dopants and future 'designer' compounds.

18 BENEFICIAL BACTERIA CAN BOOST HEAT TOLERANCE IN WHEAT

Bacteria plucked from a desert plant could help crops survive heatwaves and protect the future of food, according to new research.

35 UNDERSTANDING MEASUREMENT UNCERTAINTY

For any important measurement, it is essential to identify every source of uncertainty and to quantify the uncertainty introduced by each source.

38 2D ELECTROLYTES: A NEW TYPE OF INTELLIGENT MATERIAL

Researchers have created an intelligent material that has the structure of a 2D material but behaves like an electrolyte — and it could be a new way to deliver drugs within the body.



Cover image: ©stock.adobe.com/au/Olena Mykhaylova

READ ONLINE!

This issue is available to read and download at
www.labonline.com.au/magazine



Faster, higher, stronger

If vaccination against COVID-19 was an Olympic sport, it's fair to say that Australia would not have a chance at getting on the podium. Although our vaccination rates have been ramping up in recent weeks, they are still nowhere near the level needed to cover our entire population, twice over, by the end of 2021. Mid- to late-2022 is looking far more plausible at this stage — at which point the whole process will probably have to start all over again, due to the likely requirement of annual booster shots!

Yes, pressure is certainly being mounted on the Australian Government to accelerate the national vaccine rollout, and it appears the government is beginning to listen. In mid-May, it was announced that Australia had secured 25 million doses of Moderna's mRNA vaccine as a potential booster or variant vaccine, as well as to act as a backup in case of supply issues with the other candidates. The government also said it would seek to develop an onshore mRNA vaccine capability, following the Victorian Government's own announcement of \$50 million in funding to establish mRNA vaccine and therapeutic manufacturing in Melbourne. So here's hoping that our vaccination journey, which has so often been compared to the slow and steady pace of an Olympic marathon, is able to end with a triumphant sprint to the finish line.

And what of the Olympics themselves? At the time of writing the Tokyo Games are still going ahead, planned to be held in a 'bubble' that will see participants undergo regular COVID-19 tests. Of course these won't be the only tests going on, as there will be the usual efforts to ensure athletes are not using banned substances — always something of a challenge for

testing labs, which need to keep up with the latest developments in performance-enhancing drugs. The good news is that US scientists have now used an ion mobility-mass spectrometry method to help regulatory agencies detect existing dopants as well as future 'designer' compounds — see our article on page 16 for more on this story.

Another reason to avoid performance-enhancing drugs — specifically, anabolic androgenic steroids (AAS) — comes from a recent Norwegian study, which suggests that AAS can cause the brain to age prematurely. Researchers from Oslo University Hospital performed MRIs on the brains of 130 male weightlifters with a history of prolonged AAS use and of 99 weightlifters who had never used AAS, then used machine learning to predict the brain age of each participant. They found that AAS users had a bigger brain age gap — the difference between one's chronological age and their predicted brain age — than non-users, indicating accelerated brain ageing. Something for gym junkies to keep in mind!

Lab+Life Scientist is meanwhile here to stimulate your brain with articles on the latest research and industry developments, including the creation of human-monkey chimeric embryos (page 14), engineered heart valves that grow with their recipient (page 23) and more. We also have tips on how to keep your laboratory as error-free as possible — Jeremy Ford from Bumrungrad International Hospital outlines his lab's journey towards digitisation on page 6, or turn to page 35 to learn the importance of measurement uncertainty to risk assessment and decision-making.

Farewell till next time, and good luck to our Olympic athletes — stay COVID-safe and drug-free!

Regards,
Lauren Davis
LLS@wfmedia.com.au



Lauren Davis



Compliance with Confidence

**The World Leader in UV, Visible and NIR
Certified Reference Materials**

ISO 17034:2016 Reference Material Producer
ISO/IEC 17025 Calibration

Lifetime Guarantee (conditions apply)

Fast Recalibration Service

Technical Support



Starna

'Setting the Standard'

Call: 1 800 252 284

Tel: (02) 9659 8088

Email: sales@starna.com.au
www.starna.com



One step closer to a 100% digital laboratory

When Bumrungrad International Hospital in Thailand first went live with the InterSystems TrakCare electronic medical record (EMR) system, our clinical laboratory took a huge leap forward.

By digitising Bumrungrad's core laboratory processes — which handle 60–70% of the hospital's five million annual tests — clinicians were able to place orders directly into TrakCare and receive results within a patient's EMR, improving turnaround times and ease of use.

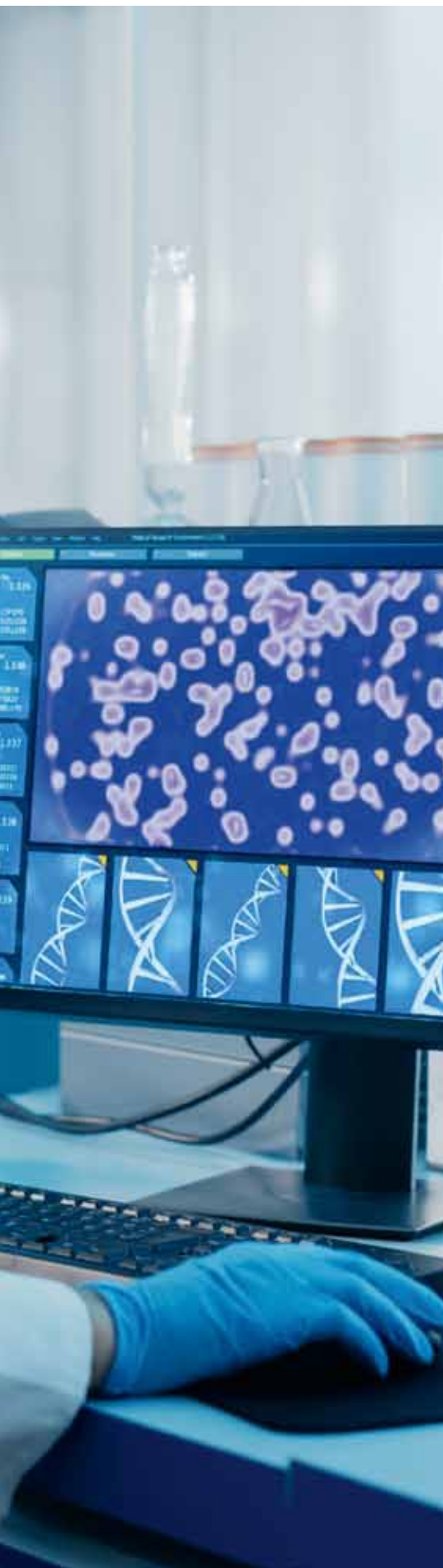
Lab reports, delivered in a structured data format rather than a PDF scan, could be analysed in context with the benefit of decision support systems. Patient safety was also protected by eliminating manual transcription errors. Rules-based workflows increased efficiencies and ability to scale, while decreasing risk.

But what about the remaining 30–40% of tests? Could we also digitise them and get similar benefits for 100% of our tests? Even though it had probably never been done before, that was the goal we set ourselves, starting with possibly the most difficult area: microbiology.

Why digital microbiology is a challenge

When it comes to the digitisation of clinical laboratories, microbiology has always presented a challenge — particularly where integration and going paperless are concerned.





Traditionally microbiology is very resource intensive with many notes recorded in a step-by-step sequence, creating a very linear yet unpredictable workflow.

Let me back up a bit and explain why. Microbiology is a laboratory department that deals with the identification of organisms which could be clinically significant or infectious and how to treat them in the most effective way — a vital aid to the clinical process.

Traditionally microbiology is very resource intensive with many notes recorded in a step-by-step sequence, creating a very linear yet unpredictable workflow. The task that I am doing now is very dependent on the task that I've just done and, more importantly, the outcomes of the task I've just done. What I do now is going to affect the future tasks, and those are all unknowns until I've completed that task.

At Bumrungrad, our approach to overcoming this challenge was extensive analysis of the tasks and outcomes before we started any design processes. We had a very good understanding of each of the individual tasks and the potential outcomes, and then we started to build relationships between those tasks and their outcomes, and the future tasks.

When we had all those relationships defined, we were able to start doing some objective analysis and decided that they fell into analytical groups — which we then defined universal standard protocols for. Because these protocols were discrete units of work, we were able to apply specific annotations of criteria which were dependent upon things like what the sample type was, and each would have a different outcome from the different sample types.

We ended up with a very complex hierarchy which from an integration point of view enables

autocompletion, or triggering of some other actions onward. We also used standard HL7 messaging throughout to communicate between the different systems involved.

Our systems environment is very diverse, like many microbiology facilities, because there is no one single provider that suits all microbiology services. Our laboratory business management system is InterSystems TrakCare Lab Enterprise, and we also use the BD BioTyper and EpiCenter combination as our microbial identification system. Then we have the VITEK system for our antibiotic sensitivity work.

All of these are controlled through HL7 messaging from TrakCare Lab Enterprise. With positive validation of the protocols within our laboratory business management system, there is acknowledgement of messages and a full audit trail is also managed.

Creating paperless microbiology workflows

At a high level the workflow is as follows. The sample is plated out and we identify the three most significant colonies, which is a manual task. If the colony is identified we add a protocol which contains one or two organisms, which is done in TrakCare Lab Enterprise. TrakCare Lab Enterprise then sends a message to BD EpiCenter, which manages all devices, and then it comes to the point of identification.

A unique material ID is generated for each organism that is going to be identified, the barcode



Jeremy Ford is Laboratory, Research and Technology Director for Bumrungrad International Hospital.

is scanned and the biotyper identifies location. BD EpiCenter says: Yes, I've received a request for organism one, I acknowledge organism one is being put on the analyser in this location, followed by organisms two and three.

Then the analysis is done, it's validated on the PC associated with BD EpiCenter and the organism is sent back to TrakCare Lab Enterprise. It then knows an antibiotic sensitivity needs to be conducted. It defines according to the various rules what type of antibiotic profile is required, and then it sends a message to the VITEK machine and the results come up on a worklist next to the machine so that the technician knows which type needs to be selected.

When it is positively identified, the analysis is performed, validated into our laboratory business management system — where it can be reviewed for quality control — and put into context with the patient. The report which goes into the electronic patient record (EPR) is created so all the antibiotic sensitivities are structured and digital.

By doing it this way we've managed to eliminate paper completely from the department. It's something that has been difficult to achieve, but we've managed to do it, which is a very good thing. And we believe it is something that very few microbiology laboratories anywhere in the world have been able to achieve.

One of the keys to our success has been staff engagement. We included the lab staff and end users during every phase and encouraged them to be granular and report back what they wanted to see in their workflows. The fact that from day one we've managed to go 100% paper-free is because

the staff have been very engaged with the project and they knew exactly what needed to be done. In fact, we've had no issues with our core workflow in microbiology going digital.

Benefits to Bumrungrad International Hospital

Let me summarise what the advantages are to Bumrungrad International Hospital. We've introduced a standard communication channel within the department and have no paper, which is a definite advantage when you are talking about pathogen detection and risk management.

We've also introduced positive identification at every step — not just of the sample, but of the task that is being performed. Discrete barcodes are generated at each point of the process and we've introduced governance of those tasks, so we've had positive acknowledgement that this is actually the right task to carry out on this patient on this sample.

Because everything is digital, and the result goes directly into the patient EPR, we've increased the safety and confidence around our process. That's because there is no transcription. It's all rule-based, which builds evidence practice and guidelines into the workflow as well as full auditing capabilities and risk management, identifying issues before they occur.

We've also managed to make our workflow considerably leaner. Because everything is rule-based and automatic, there's no going back and double-checking.

Another advantage is that all our results are reported in the EPR in a structured format. By

allowing our clinicians to view them in a structured way, that enables us to do granular infection control and surveillance reporting — in not quite real time but pretty much real time, because we can run reports as and when required.

We can also use protocols, which puts us in a good position to apply robotics to microbiology functions. The intelligence has already been built into the protocols, so it's just about finding the right automated microbiology solution. That is going to come, I'm certain of it.

Last but not least, our digital microbiology solution is also scalable. It's not dependent on members of staff or increasing physical space. The only thing that is required is extra analysers.

These are the main advantages to our business. I hope this has inspired you to take on digitisation of your own microbiology department. It's a hard journey and takes a lot of engagement, dedication and analysis of your workflow and environment. But as we've shown, it's possible to do it, and I would say well worth doing.

**Jeremy Ford is Laboratory, Research and Technology Director for Bumrungrad International Hospital in Bangkok. Accredited by Joint Commission International, Bumrungrad is recognised as one of the world's leading and most technologically advanced hospitals. Specialising in tertiary care with a patient-centric approach, it is one of the largest private hospitals in Southeast Asia, with 580 beds and more than 30 specialty centres. The clinical laboratory is both CAP and ISO 15189 accredited.*



Accelerate Your Research

Spin the smart way with your new Centrifuge 5910 Ri

Centrifuge 5910 Ri combines high capacity and performance in a compact footprint with an ergonomic design. It comes with an intuitive VisioNize® touch interface and an advanced temperature management system.

Discover excellent versatility with 10 different rotors and our universal rotor concept.

Find out more: www.eppendorf.com/accelerate-your-research



www.eppendorf.com

Eppendorf®, the Eppendorf Brand Design and VisioNize® are registered trademarks of Eppendorf AG, Hamburg, Germany. All rights reserved, including graphics and images. Copyright © 2021 by Eppendorf AG.





Five-in-one strip test detects prohibited meats in Halal food

Researchers at Chulalongkorn University's Halal Science Center have developed an all-in-one strip test to quickly and accurately detect the DNA of five forbidden meats in a single test.

Food tainted with certain types of meat is forbidden by Islamic dietary law and is a major concern for Muslims, with surveys showing that pork can regularly be found mixed into beef in Thailand and other countries. These concerns motivated the Halal Science Center to invent a nucleic acid lateral flow assay (strip test) to detect foreign meat contamination, which consumers and food manufacturers can perform by themselves.

The strip test is a highly effective DNA technology, based on the principle of chromatography and hybridisation, using a membrane test strip made from nylon or nitrocellulose that allows a solution to flow through its porous surface freely. These membrane strips have a probe affixed to the surface at a specific location. When the multiplex PCR-amplified target DNA solution from food samples flows through the immobilised probes, coagulation occurs and forms colour bands on the chromogenic membrane (strip).

Apart from cutting processing time and cost, the strip test detects traces of five prohibited meats in food (pork, dog, cat, rodent and monkey) in one single test. The test can be used with raw and cooked food, as well as other ingredients.

"This innovation certainly addresses the concerns that Muslim consumers and the general public have," said Anat Denyingyote, Assistant Director and Head of Science and Technology Services Group, Halal Science Center. "The strip test detects targeted DNA, so it can yield a 100% accurate result within three hours, which is much faster than sending the samples to the lab that normally takes one to five business days. Moreover, it is also easy to use, cheap and convenient."

While strip test users are currently limited to business operators, Halal inspection agencies and a few consumers with a science background, the plan is to make the strip test kit widely available at a cost of B300–500 (\$12–\$20), which is 10 times cheaper than a forensic lab test.

"We want Muslim consumers, the public and food business operators to be able to perform the test on their own at a reduced cost for safety and their peace of mind," Anat said.

"Next, we will further develop the strip test into a comprehensive test kit capable of yielding faster results that can be used for onsite detection."

Methane-eating microbes found living in paperbark trees

Scientists from Southern Cross University (SCU), in collaboration with Monash University and The University of Melbourne, have uncovered an unlikely microscopic ally in the battle to reduce the amount of methane gas in the atmosphere — a methane-eating microbial community living in the bark of the common Australian paperbark tree (*Melaleuca quinquenervia*). Their breakthrough has been published in the journal *Nature Communications*.

Methane is a very potent greenhouse gas — about 45 times more so than carbon dioxide. While trees help lock up carbon dioxide during photosynthesis, this latest research reveals that some trees also play an important role in regulating the methane gas cycle.

"This is a groundbreaking discovery that opens up a whole new area of research about novel microbes living in the bark of trees and their role in regulating methane," said SCU postdoctoral researcher Dr Luke Jeffrey, lead author on the new study. "It suggests that our scientific understanding of the global methane cycle may need a rethink."

Dr Jeffrey and colleagues made the discovery while on a field study in wetlands on the far north coast of NSW. SCU's Professor Scott Johnston explained, "When we first saw large amounts of methane coming out of the bark of *Melaleuca* trees, we wondered whether there might be bacteria residing in bark making an easy living by eating the abundant methane. Now we know."

The microbes were found to mitigate a large proportion of the methane released from the trees, consuming about one-third of total methane emissions. With this newfound knowledge, land managers, decision-makers and future climate change mitigation strategies can be better advised in ways to maximise carbon sequestration in forests and avoid potential and unwanted methane emissions.

"It took more than three years of careful experiment design and systematic method development to identify the microbes and resolve their role in consuming methane," said SCU's Professor Damien Maher. "It represents an exciting new frontier in our understanding of how trees influence methane in the atmosphere."



Dr Luke Jeffrey conducting wetland research.

Automated Sample Storage Right Where You Need It

The new Verso Q20 boasts many of the accommodating features of a large system in an extremely compact footprint, so your samples can be stored anywhere you need them. Thanks to its fully automated design, this small but powerful system allows you to spend more time being productive and less time managing samples.

Verso Q20 sets a new standard in size and performance, providing the perfect opportunity to transition from manual sample storage to an automated process.



Temperature Range:
Ambient to -20°C



Capacity:
Up to 36,000 tubes



Throughput:
Up to 500 tubes/hour

Universal Picker

The Universal Picker provides the ability to pick multiple labware types with different diameters in one picker module.

Benefit from Convenience

Verso Q20 gives you the ability to pick one or 1,000 samples at the touch of a fingertip.



Connect Your Collection

Knowledge is power, and Verso Q20 provides complete transparency of your samples at all times.

Superior Flexibility

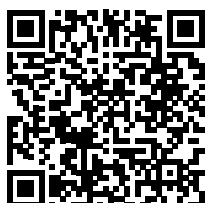
The system allows for a variety of sample configurations and tube/plate types.

Take Full Control of Your Samples

Thanks to its innovative user-friendly design, lost or compromised samples become a thing of the past.

Environmentally Friendly

Superior insulation technology for ultra-low energy consumption.



Please contact Bio-Strategy:

T 1800 00 84 53

sales.au@bio-strategy.com

www.bio-strategy.com



bio-strategy
delivering technology



Copper-treated face masks deactivate SARS-CoV-2

Australian materials technology company Xefco has developed a groundbreaking antiviral technology that has the ability to destroy all viruses and bacteria — including SARS-CoV-2 — within minutes, and is now being used in the production of face masks by Swiss antimicrobial textile company HeiQ Materials.

Founded in 2018, Xefco specialises in innovative coating technologies for the textile industry. At the onset of the pandemic, the business identified an opportunity to leverage its proprietary coating technologies to develop highly effective antimicrobial treatments, utilising the antiviral, antibacterial and antifungal properties of copper.

Working with the Institute for Frontier Materials (IFM) at Deakin University, which is part of the ARC Research Hub for Future Fibres, the company developed an ultrathin pure copper coating applied via a high-tech vapour deposition process, called Metallix, which converts a minute amount of copper into vapour, allowing it to be deposited evenly to surround each fibre in a textile. It is claimed to be the world's first thin-film antiviral copper treatment for textiles.

Researchers from The Peter Doherty Institute for Infection and Immunity exposed Metallix-treated textiles to known infectious concentrations of SARS-CoV-2 for incremental periods of time before extracting and measuring the remaining infectious virus titre. The results showed that Metallix treated textiles deactivated the SARS-CoV-2 virus by 97.79% within five minutes and 99.95% within 15 minutes, with no infectious virus detectable on the textiles after 30 minutes. Treated materials have also been tested to kill 100% of *Staphylococcus aureus* and *Klebsiella pneumoniae* and deactivate 99.95% of H1N1 virus and 99.9% of human coronavirus 229E.

"The rapid efficacy of the coating treatment is unprecedented," said Tom Hussey, CEO and co-founder of Xefco. "Metallix destroys the virus [SARS-CoV-2] within minutes, whereas other existing treatments can take hours."

Xefco is now collaborating with HeiQ Materials to commercialise materials and medical devices incorporating the technology, with the latter launching a metallic-looking, high-tech surgical mask known as HeiQ Metallix. "Metallix can be applied to a broad range of materials, including those that are difficult to treat using conventional finishing methods, unlocking new possibilities for personal protective equipment (PPE), medical textiles and air filtration aiding in the defence against COVID-19," Hussey said. "Mask production is just the start — we hope to roll out the coating treatment onto other critical materials such as surgical gowns, drapes and curtains as well as air filters in hotels, planes and restaurants."

Newly designed drug compound to stop malaria in its tracks

Researchers at The Francis Crick Institute and the Latvian Institute of Organic Synthesis have designed a drug-like compound which effectively blocks a critical step in the malaria parasite's life cycle, and are now working to develop this compound into a potential first-of-its-kind malaria treatment.

The UK and Latvian scientists developed a set of compounds designed to stop the parasite being able to burst out of red blood cells — a process vital to its replication and life cycle. They found one compound in particular was highly effective in human cell tests, with their results published in the journal *PNAS*.

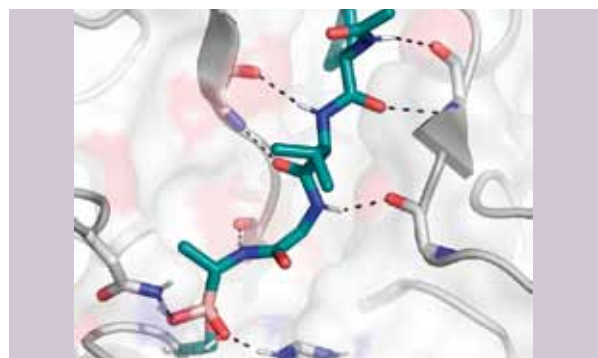
"Malaria parasites invade red blood cells where they replicate many times, before bursting out into the bloodstream to repeat the process," explained Mike Blackman, lead author and group leader of the Malaria Biochemistry Laboratory at the Crick. "It's this cycle and build-up of infected red blood cells which causes the symptoms and sometimes fatal effects of the disease."

"If we can effectively trap malaria in the cell by blocking the parasite's exit route, we could stop the disease in its tracks and halt its devastating cycle of invading cells."

The new compound works by blocking an enzyme called SUB1, which is critical for malaria to burst out of red blood cells. Existing antimalarials work by killing the parasite within the cell, so the researchers hope this alternative drug action will overcome the resistance the parasite has acquired. Importantly, the compound is also able to pass through the membranes of the red blood cell and of the compartment within the cell where the parasites reside.

The team is continuing to optimise the compound, making it smaller and more potent. If successful, it will need to be tested in further experiments and in animal and human trials to show it is safe and effective, before being made available to people.

"Many existing antimalarial drugs are plant derived and, while they're incredibly effective, we don't know the precise mechanisms behind how they work," noted study author Chrislaine Withers-Martinez, a researcher in the Malaria Biochemistry Laboratory. "Our decades of research have helped us identify and understand pathways crucial to the malaria life cycle, allowing us to rationally design new drug compounds based on the structure and mechanism of critical enzymes like SUB1."



The optimised boronic acid inhibitor shown covalently bound into the active site of SUB1. Hydrogen bonds between the inhibitor and the enzyme are shown as dotted lines.

NEW!



SMARTCHECK. Faster Pipette Verification.

Smartcheck determines if a pipette is dispensing accurately in less than 60 seconds.

Introducing SmartCheck™, a new innovation from RAININ that verifies if a pipette is dispensing accurately. It's small, intuitive and fast! Simply dispense deionized water into the liquid chamber and SmartCheck™ automatically detects the test volume, then prompts you to dispense the same volume three more times. From start to finish, SmartCheck™ delivers a pass / fail result in less than 60 seconds. Use RAININ SmartCheck™ to avoid the costly and time-consuming investigation that an out-of-tolerance pipette can prompt. Contact us NOW to book in a demonstration!



Request a **FREE QUOTE** or **TRIAL NOW!**

Email info.mtaus@mt.com or call **1300 659 761**
<http://www.mt.com/smartcheck>

RAININ
Pipetting 360°

Researchers create human–monkey chimeric embryos

The ability to grow the cells of one species within an organism of a different species offers scientists a powerful tool for research and medicine, yet developing such capabilities has been a formidable challenge. US and Chinese researchers, led by Professor Juan Carlos Izpisua Belmonte from the Salk Institute for Biological Sciences, have now come one step closer towards this goal by realising the integration of human cells into animal tissue.

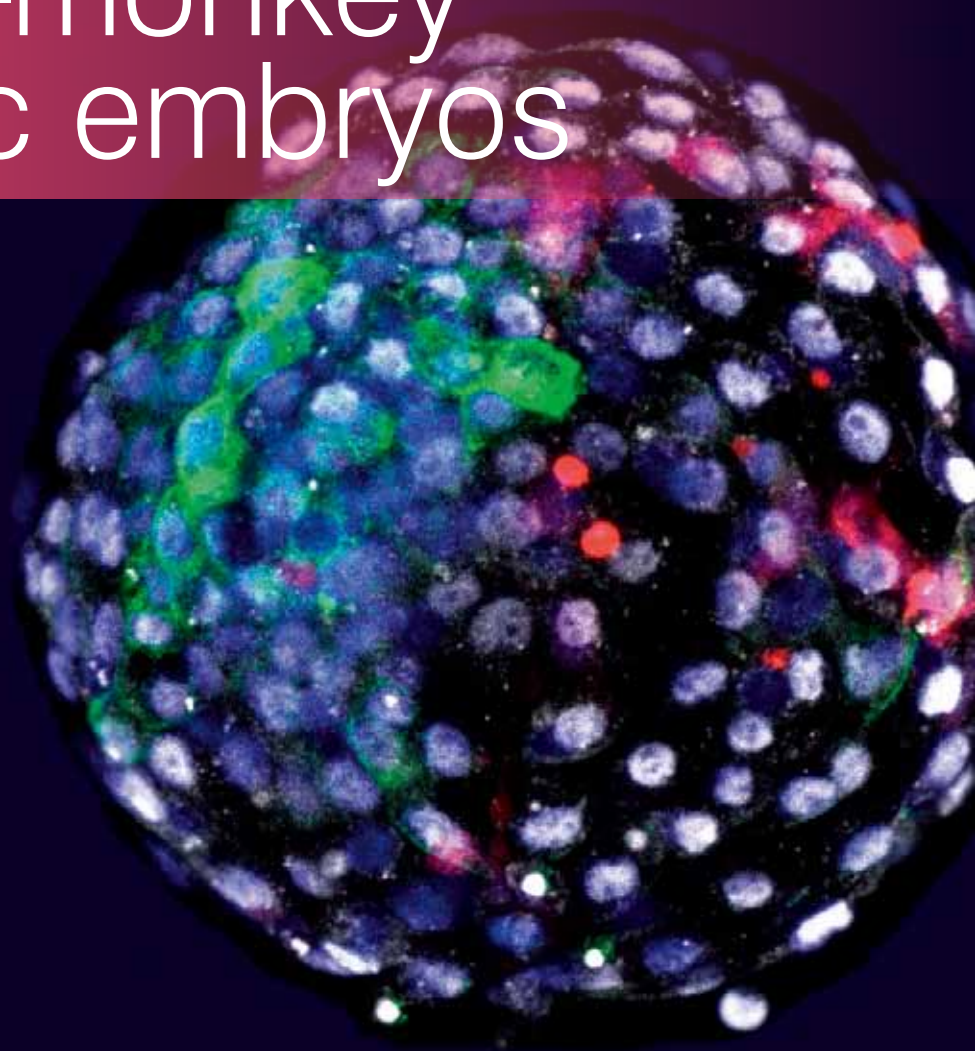
Published in the journal *Cell*, the team's new study builds on Prof Izpisua Belmonte's work to take the next step in chimeric organisms — organisms that contain cells from two or more species — to understand a host of diseases and address the severe shortage in donor organs. As part of the study, the scientists injected human stem cells into primate embryos and were able to grow chimeric embryos for up to 19 days.

The World Health Organization (WHO) estimates that the 130,000 organ transplants performed every year represent only 10%, which is exacerbated by a shortage of available organs. Researchers have hoped that growing human cells

in pig tissue — whose organ size, physiology and anatomy are similar to humans' — could alleviate this problem.

In a 2017 *Cell* study, Prof Izpisua Belmonte's group reported groundbreaking work in which they incorporated human cells into early-stage pig tissue, marking the first step towards producing transplantable human organs using large animals. But the contribution of human cells was fairly low, which could be due to the large evolutionary distance (90 million years) between the two species. So Prof Izpisua Belmonte set out to investigate chimera formation in a more closely related species: macaques.

While these types of chimeras with macaques wouldn't be used for human organ transplants, they nevertheless reveal invaluable information about how human cells develop and integrate, and how cells of



Using fluorescent stains, researchers are able to visualise cells of different species origins in an early-stage embryo. Image credit: Weizhi Ji, Kunming University of Science and Technology.

Researchers could ultimately improve the integration of human cells into more suitable hosts, such as pigs, that could be used in regenerative medicine, as well as better understanding the ageing process.

to stay alive and grow outside the body for an extended period of time, with the results published in the journal *Science*. In the present study, six days after the monkey embryos had been created in petri dishes, each one was injected with 25 human cells that had been tagged with a fluorescent protein. The cells were from an induced pluripotent cell line known as extended pluripotent stem cells, which have the potential to contribute to both embryonic and extra-embryonic tissues.

Through immunofluorescent studies, in which antibodies bind to the fluorescently tagged stem cells, the scientists observed that human stem cells survived and integrated with better relative efficiency than in the previous experiments in pig tissue. After one day, human cells were detected in 132 embryos; after 10 days, 103 of the chimeric embryos were still developing; and by day 19, only three chimeras were still alive. Importantly, the percentage of human cells in the embryos remained high throughout the time they continued to grow.

“Historically, the generation of human–animal chimeras has suffered from low efficiency and integration of human cells into the host species,” Prof Belmonte said. “Generation of a chimera between human and non-human primate, a species more closely related to humans along the evolutionary timeline than all previously used species, will allow us to gain better insight into whether there are evolutionarily imposed barriers to chimera generation and if there are any means by which we can overcome them.”

To identify the molecular communication pathways between the two species’ cells in the current study, Prof Belmonte’s team analysed the chimeric transcriptome, a readout of which genes and molecules are active, for both the human and monkey cells. They observed that cells from chimeric tissue had distinct transcriptomic profiles from controls and detected several communications pathways that were strengthened or novel in the chimeric cells.

“From these analyses, several communication pathways that were either novel or strengthened in the chimeric cells were identified,” Prof Belmonte said. “Understanding which pathways are involved in chimeric cell communication will allow us to possibly

enhance this communication and increase the efficiency of chimerism in a host species that’s more evolutionarily distant to humans.”

Once this molecular communication is further understood, chimeric organisms could allow researchers an unprecedented glimpse into the earliest stages of human development. Chimeric organisms containing human cells could be used to generate cells and organs for transplantations in host species more evolutionarily distant to humans, like pigs, that might be more appropriate for various reasons (social, economic and ethical, among others).

Additionally, these studies constitute a new platform to study how specific diseases arise. For instance, a particular gene that may be associated with a certain cancer could be engineered in a human cell. Then, observing the course of disease progression using those engineered cells in a chimeric model might reveal more applicable results than a typical animal model in which the disease might take a different course. Chimeric models of disease could also be used to test the efficacy of drug compounds and obtain results that could similarly better reflect the response in humans.

“As we are unable to conduct certain types of experiments in humans, it is essential that we have better models to more accurately study and understand human biology and disease,” said Prof Belmonte. “An important goal of experimental biology is the development of model systems that allow for the study of human diseases under in vivo conditions.”

Another research avenue where chimerism could offer unique insights is ageing. Prof Belmonte said researchers don’t know if organs age at the same rate or if perhaps one organ drives the ageing of all the other organs and acts as a master switch for the ageing process. Using chimerism to grow, for example, the organ of a common rat in a much longer-lived species like the naked mole rat, scientists could begin to probe which organs may be key to ageing and what signals are involved in their survival.

“These chimeric approaches could be really very useful for advancing biomedical research not just at the very earliest stage of life, but also the latest stage of life,” Prof Belmonte said.

different species communicate with one another. Prof Belmonte likens the process of two types of cells integrating to communicate with different languages: human cells in pig tissue was akin to the cells trying to find common ground between Chinese and French, for example, whereas human cells in macaques operated more like two closely related languages, like Spanish and French. By better understanding the molecular pathways involved in this interspecies communication, researchers could ultimately improve the integration of human cells into more suitable hosts, such as pigs, that could be used in regenerative medicine, as well as better understanding the ageing process.

The study was made possible when Prof Belmonte’s team — collaborating with Weizhi Ji of Kunming University of Science and Technology in China — generated technology that allowed macaque embryos



New technique for better doping detection

As the world awaits the long-delayed Tokyo Olympics, a new method for detecting doping compounds in urine samples could level the playing field for those trying to keep athletics clean, as US scientists report the use of ion mobility–mass spectrometry to help regulatory agencies detect existing dopants and future ‘designer’ compounds.

Each year, the World Anti-Doping Agency (WADA) publishes a list of substances, including steroids, that athletes are prohibited from using. However, it can be difficult to distinguish an athlete’s natural or ‘endogenous’ steroids from synthetic ‘exogenous’ ones administered to boost performance. And regulatory bodies also face another challenge, as noted by Dr Christopher Chouinard from the Florida Institute of Technology.

“As quickly as we develop methods to look for performance-enhancing drugs, clandestine labs develop new substances that give athletes a competitive advantage,” Dr Chouinard said, noting that these designer drugs evade detection if testing labs don’t know to look for their specific chemical structures.

Looking to combat this, he and his team developed an assay that can differentiate endogenous and exogenous steroids and can also anticipate the structure of new compounds that might show up in athletes’ urine samples.

Currently, testing labs analyse samples using tandem mass spectrometry (MS) and gas or liquid chromatography. These approaches break up molecules in the sample and separate the fragments, yielding spectra that can reveal the identity of the original, intact compounds. But it can be tough to differentiate molecules with minor structural differences — including isomers — that distinguish endogenous steroids from exogenous ones, such as the synthetic anabolic steroids athletes take to build muscle.

To accentuate those differences, Dr Chouinard pairs MS with ion mobility (IM) spectrometry, a separation technique he learned as a graduate student with Dr Richard Yost at the University of Florida. Dr Yost’s team and others found that the differences between isomers could be made even more apparent if the molecules in a sample were modified prior to IM-mass spec analysis by reacting them with other compounds. After Dr Chouinard set up his own lab in 2018, he applied this technique by reacting steroid samples with ozone or acetone in the presence of ultraviolet light — reactions already well established among researchers who study lipid isomers, but new in the anti-doping arena.

Last year, Dr Chouinard’s team reported they had successfully used these reactions with IM–MS to improve isomer separation, identification and

quantification for a few steroids in sample solutions. Now, the researchers report they have tested this technique in urine against nearly half the prohibited steroids on WADA’s list and have shown it can successfully characterise and identify these compounds. They also showed the method can characterise and identify banned glucocorticoids, such as cortisone, that improve athletic performance by suppressing inflammation from injuries. Detection limits are below 1 ng/mL.

In addition to tracking down known dopants, the team wants to be able to find newly created illicit steroids not yet known to WADA. With Florida Institute of Technology collaborators including Dr Roberto Peverati, they are developing computational modelling and machine learning techniques to try to predict the structure, spectra and other characteristics of these molecules.

“If we can develop methods to identify any theoretical steroids in the future, we could dramatically reduce doping because we would be able to detect these new species immediately, without the lag time that’s been associated with anti-doping testing over the last 40 years,” Dr Chouinard said.

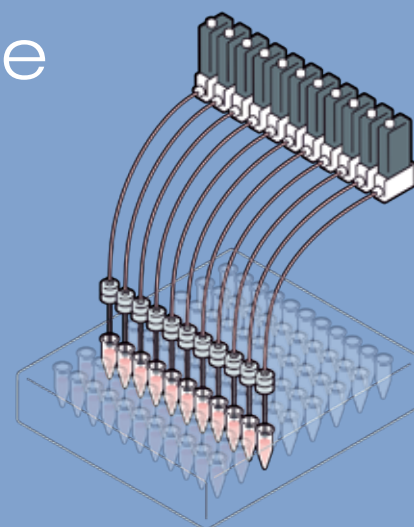
Though the assays themselves are quick, simple and inexpensive, Dr Chouinard noted that IM instruments are costly, with a price ranging up to roughly a million dollars. But with the support of anti-doping funding organisations like the Partnership for Clean Competition (PCC), he hopes more labs might be willing to foot that bill, so long as the method offers a significant advantage in detection and deterrence.



Join the Lab and Pharma companies who've made the switch

Extremely precise and reliable dosing technology is required to produce high-quality batches in a very short period of time. Bürkert timepressure dosing technology speeds up the dosing process and increases the efficiency of your synthesiser.

Now that's SMART.



**We make
ideas flow.**

bürkert
FLUID CONTROL SYSTEMS



© Stock.Adbbe.com/au/Paeko Maksim

Beneficial bacteria

can boost heat tolerance in wheat

Bacteria plucked from a desert plant could help crops survive heatwaves and protect the future of food, according to new research conducted by King Abdullah University of Science and Technology (KAUST) researchers and published in the journal *EMBO reports*.

Global warming has increased the number of severe heatwaves that wreak havoc on agriculture, reduce crop yields and threaten food supplies. However, not all plants perish in extreme heat. Some have natural heat tolerance, while others acquire heat tolerance after previous exposure to higher temperatures than normal, similar to how vaccines trigger the immune system with a tiny dose of virus.

But breeding heat-tolerant crops is laborious and expensive, and slightly warming entire fields is even trickier. There is therefore growing interest in harnessing microbes to protect plants, with biologists showing that root-dwelling bacteria can help their herbaceous hosts survive extreme conditions such as drought, excessive salt or heat.

“Beneficial bacteria could become one of the quickest, cheapest and greenest ways to help achieve sustainable agriculture,” said KAUST postdoc Kirti Shekhawat. “However, no long-term studies have proven they work in the real world, and we haven’t yet uncovered what’s happening on a molecular level.”

To fill this knowledge gap, Shekhawat, along with a team led by Heribert Hirt, selected the beneficial bacteria SA187 that lives in the root of a robust desert shrub, *Indigofera argentea*. They coated wheat seeds with the bacteria and then planted them in the lab along with some untreated seeds. After six days, they heated the crops at 44°C for two hours. “Any longer would kill them all,” said Shekhawat.

The untreated wheat suffered leaf damage and ceased to grow, while the treated wheat emerged unscathed and flourished, suggesting that the bacteria had triggered heat tolerance. Shekhawat explained, “The bacteria enter the plant as soon as the seeds germinate, and they live happily in symbiosis for the plant’s entire life.”

The researchers then grew their wheat for several years in natural fields in Dubai, where temperatures can reach 45°C. Here, wheat is usually grown only in winter, but the bacteria-bolstered crops consistently had yields between 20 and 50% higher than normal. “We were incredibly happy to see that a single bacterial species could protect crops like this,” said Shekhawat.

The team then used the model plant *Arabidopsis* to screen all the plant genes expressed under heat stress, both with and without the bacteria. They found that the bacteria produce metabolites that are converted into the plant hormone ethylene, which primes the plant’s heat-resistance genes for action. “Essentially, the bacteria teach the plant how to use its own defence system,” Shekhawat said.

Thousands of other bacteria have the power to protect plants against diverse threats, from droughts to fungi, and the team is already testing some on other crops, including vegetables. According to Hirt, “We have just scratched the surface of this hidden world of soil that we once dismissed as dead matter. Beneficial bacteria could help transform an unsustainable agricultural system into a truly ecological one.”

YOUR WORK CANNOT WAIT



LabChip® GX Touch™ Nucleic Acid Analyzer

Power through your backlog with a fast, high-throughput QC system which does not require specialized consumables. The LabChip® GX Touch™ nucleic acid analyzer is resilient to on-going supply chain disruptions, because it is compatible with a wide range of consumables.

DNA and RNA quantitation and sizing can be done in seconds using automated capillary electrophoresis separation. The LabChip® GX Touch™ nucleic acid analyzer's microfluidic technology generates reproducible, high-resolution data.

For more information visit our website by scanning the QR Code.

Toll free: 1800 033 319

Email: ausales@perkinelmer.com

- Screening nucleic acid source material for SARS-CoV-2 vaccine development and manufacturing
- NGS library preparation (smear and fragment analysis) & quality control
- RNA and DNA fragment analysis (including cell-free DNA, DNA isolated from FFPE samples, and PCR-free libraries)
- Quantitation & qualification for CRISPR fragment analysis
- Characterization & QC of small RNA molecules and CRISPR/Cas9 gRNA



For research use only. Not for use in diagnostic procedures.

Copyright © 2021 PerkinElmer, Inc. AG012105_12_AD All rights reserved. PerkinElmer® is a registered trademark of PerkinElmer, Inc. All other trademarks are the property of their respective owners.


PerkinElmer®
For the Better



Towards greener labs with Thermo Fisher Scientific

Labs, whether in academia and research or biotechnology and manufacturing, are all aiming to reduce their carbon footprint. A recent survey conducted by Thermo Fisher Scientific indicated that over 70% of respondents would like to go greener in the lab. The company is now achieving new innovative approaches in both thinking and manufacturing in its mission to make the world healthier, cleaner and safer.

The ACT label

Laboratory workers can opt for more sustainably conscious products through the use of the ACT label, created by non-profit organisation My Green Lab. This virtual label helps consumers make smarter and more sustainable product choices by providing a 'score' for each product that is labelled. The score is based on the product's environmental impact with regard to its manufacturing practices, energy and water use, and end-of-life disposal, with an emphasis on accountability (A), consistency (C) and transparency (T).

Thermo Fisher Scientific was the first to ACT label its laboratory consumables — such as its Thermo Scientific™ Matrix™ storage and liquid handling products — in recognition of the fact that such consumables are often single-use and have a bad reputation when it comes to sustainability; the need to implement sustainability in the manufacturing of these products was therefore crucial. This is an example of how the ACT label has helped incentivise manufacturing and end-of-life changes for single-use consumables.

Energy efficiency

A 2015 study on laboratory energy consumption by the Center for Energy Efficient Laboratories (CEEL)^[1] determined that laboratories can use over 800 GWh of energy each year — equivalent to the yearly greenhouse gas emissions from 122,200 passenger cars^[2]. Indeed, a single ultra-low temperature lab freezer can use as much as 14,000 kWh of energy per year.

Thermo Fisher Scientific is committed to designing energy-efficient products

that help power your work and support your sustainability objectives without compromising performance. For example, the company's ENERGY STAR® certified ULT freezers are specifically designed and engineered for the safe use of green hydrocarbon (HC) refrigerants that are in compliance with the US Environmental Protection Agency's (EPA) Significant New Alternatives Policy (SNAP) program, the European Union's F-gas regulations and other regulatory programs. These hydrocarbon refrigerants not only help improve system performance, but they also do so with minimal environmental impact. They use 70% less energy and have been shown to operate 25–42% more efficiently than conventional-refrigerant ultra-low temperature units.

The Thermo Scientific TSX series ULT freezers also utilise a variable speed compressor powered by adaptive V-drive technology, designed to minimise energy consumption without sacrificing sample security. Rather than running continuously, the V-drive system operates like a car,

accelerating and decelerating in response to usage and the environment, delivering the needed cooling capacity for the given situation and helping reduce the stress on the system. Units like those within the TSX series also output less heat, meaning they can be brought into the main lab area as they won't make the surrounding space hotter. Furthermore, less heat output means less of a burden on the HVAC system, translating to lower energy bills.

The company's Sorvall™ centrifuge range meanwhile offers several key features that contribute to reduced energy use during operation. Sorvall LYNX 4000 and LYNX 6000 Superspeed Centrifuges have a Green Mode setting, which puts the centrifuge in sleep mode (idle) when not in use for more than two hours. The Smart Vacuum feature of the LYNX 6000 removes up to 80% of the air inside the centrifuge chamber, minimising air friction on the spinning rotor. The Sorvall BP 8 and 16, Sorvall BIOS 16, and Cryofuge™ 8 and 16 models also include an energy-saving mode that shuts off the automatic cooling function when the instrument is not in use, and an Auto-Door™ feature which shuts off the cooling system when the door opens.

Less waste

As a supplier of life science products, Thermo Fisher Scientific is focused on reducing waste and generating significant cost savings for itself and its customers. For example, the company has designed products such as the One Shot 50 mL FBS (foetal bovine serum) bottle, which generates 33% less waste than aliquoting from 500 mL bottles. Meanwhile, the company's various manufacturing sites strive to divert at least 90% of their waste materials from landfill.

Fourteen of Thermo Fisher Scientific's manufacturing sites in the US, the UK, Singapore, Germany, the Netherlands and Israel have been independently certified for zero waste, with audits validating that more than 90% of the nonhazardous waste from these sites is diverted from landfill. The company also aims to incinerate no more than 10% of its diverted waste, compliant with host government guidelines — though in the case of its Norway and Japan facilities, for example, incineration may be greater than 10% as these countries' infrastructure supports waste-for-energy incineration on a large scale.

Sustainable packaging

The first rule of packaging is that it must protect the product — whether from the mechanical rigours of handling and shipping or extreme temperatures. Thermo Fisher Scientific aims to design packaging solutions that preserve product integrity while maximising freight density and therefore using less fuel. The company is also utilising technology that consumes fewer resources per reaction, redesigning the packaging of individual components within kits, reducing the use of dry ice and other cold shipping methods, and transitioning to more sustainable shipping materials.

Invitrogen ProQuantum immunoassay kits are one example: they use more sustainable packaging and offer less waste than a traditional immunoassay such as an ELISA. This is achieved through the assays' proximity-based amplification technology, which allows researchers to detect lower levels of protein with lower sample input than traditional methods. With higher sensitivity and very low sample consumption, users not only can get the most out of their precious samples but also consume less plastic than other immunoassays. Furthermore, researchers can store four ProQuantum kits in the same space as just one traditional ELISA kit.

Another example is a new alternative for expanded polystyrene (EPS) coolers, which have for decades been the preferred external packaging for cold-chain shipments but have limited recycling options. Thermo Fisher Scientific has developed a 100% paper, readily recyclable cooler that meets the thermal and structural requirements necessary to uphold its stringent product quality standards, but with a smaller environmental footprint. The company encourages its customers to recycle these paper coolers alongside other paper and corrugate materials, and explore local recyclers for EPS foam coolers.

Less hazardous

Minimising hazardous materials and hazardous waste in the lab is a win for both safety and the environment. Fewer hazards can lower exposure risk for lab personnel and reduce costs for hazardous waste disposal.

By incorporating principles of green chemistry and green engineering into its product design, Thermo Fisher Scientific has created greener product alternatives that can help advance sustainability in the lab by

minimising the use of hazardous chemicals, minimising waste and material consumption, and increasing energy efficiency. These products, which are signposted on the company's website with a distinctive green leaf symbol, have been rigorously evaluated to ensure they meet at least one of the following criteria:

- Inherently less hazardous
- Reduces the need to use other hazardous materials
- Generates less hazardous waste
- Reformulated so as not to require Dangerous Good for Transport (TDG) classification
- Free of ozone-depleting substances

The company's scientists have also developed a proprietary fluorescent resonance energy transfer (FRET) assay that helps to eliminate radioactivity in testing enzyme-based product lines. Replacing radioactive isotopes with a fluorescent dye has reduced radioactivity by 60% at its sites in Carlsbad, California, and Austin, Texas, making both employees and facilities safer. This new process has also allowed the company to execute assays in half the time and with more accurate results. This breakthrough has the potential to one day completely eliminate radioactivity in the quality control testing of many laboratory reagents.

Conclusion

The science of the global climate and environmental crisis has become a defining issue of our time, with life scientists rightfully expecting accountability from their suppliers and partners. Thermo Fisher Scientific is committed to improving its collective impact on the planet by introducing greener products, optimising resources and cutting waste in their mission of making the world healthier, cleaner and safer.

For more information, visit thermofisher.com

References

1. Allison Paradise (2015) Market Assessment of Energy Efficiency Opportunities in Laboratories.
2. US EPA Greenhouse Gas Equivalencies Calculator, <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>. Accessed 03 December 2020.

ThermoFisher
S C I E N T I F I C

NGS library preparation

The epMotion 5073t NGS solution has everything required to automate the NGS library preparation of up to 24 samples and perform nucleic acid purification on the same workstation.

The product is equipped with two single-channel and one multi-channel dispensing tools to offer the flexibility to work with different plate or tube formats, and provides uninterrupted library preparation by automatically switching between the single- and multi-channel dispensing tools when needed.

The TipHolder 73 and Gripper Tower included in the epMotion 5073t NGS solution allow for the storage of up to 5 x 96 tips on the deck to increase tip availability. An optional Reservoir Rack Module NGS can be added to store consumables and NGS reagents on one deck position and, when combined with the Reservoir Rack Module Tips, further increases tip capacity to enable complex methods to be run on the system with minimal user intervention.

All labware, tips and liquid levels are checked prior to each run by the contact-free optical sensor for safe operation, and an optional UV lamp and HEPA filter are available to provide clean air conditions.

All systems with serial number 7000 or higher now come with integrated LED lights in the CleanCap hood to illuminate the deck and provide users with a visual signal on the status of the device so they can see from afar if the system is idle, running or has finished a run. The systems also have an improved tip ejector to speed up pipetting steps for shorter run times with certain applications.

The epMotion 5073t NGS solution has an integrated Eppendorf ThermoMixer for mixing of magnetic beads and a thermal module for temperature incubations to enable upstream nucleic acid purification on the same platform.

NGS library preparation and nucleic acid purification methods can be easily designed, optimised and implemented using the intuitive interface of the epBlue software on the MultiCon PC (15.6" screen) controller.

Eppendorf South Pacific Pty Ltd

www.eppendorf.com.au



Sample management system

Hamilton Storage, an affiliate entity of Hamilton Company, is a designer and manufacturer of automated storage systems for biological and compound samples. The Verso Q20 offers many of the accommodating features of a large system in a compact footprint, so samples can be stored anywhere they are needed. Its fully automated design means the small but powerful system should allow users to spend more time being productive and less time managing samples, with its size and performance providing the opportunity to transition from manual sample storage to an automated process.

Similar to the larger Verso and BiOS systems from Hamilton Storage, the Verso Q20 platform is controlled by powerful INSTINCT S software and can be easily incorporated with the user's LIMS. The product also integrates with liquid handling workstations from Hamilton Company and other third-party robotic devices for fully automated, hands-free workflows.

Sample introduction and retrieval take place through the foot switch-operated I/O module for rapid and hassle-free access, while barcode scanners initiate an audit trail. A Universal Tube Picker allows for the cherry picking of a variety of labware types in different sizes.

Bio-Strategy Pty Ltd

www.bio-strategy.com



Laboratory stomacher/sample mixer

Pacific Laboratory Products' DBLE-400 laboratory stomacher/sample mixer, from DAIHAN Scientific, is used for blending and filtering solid samples for microbiology. It is a suitable instrument for food microbiology, veterinary, clinical, pharmaceutical, molecular extraction, toxin research and environmental analysis.

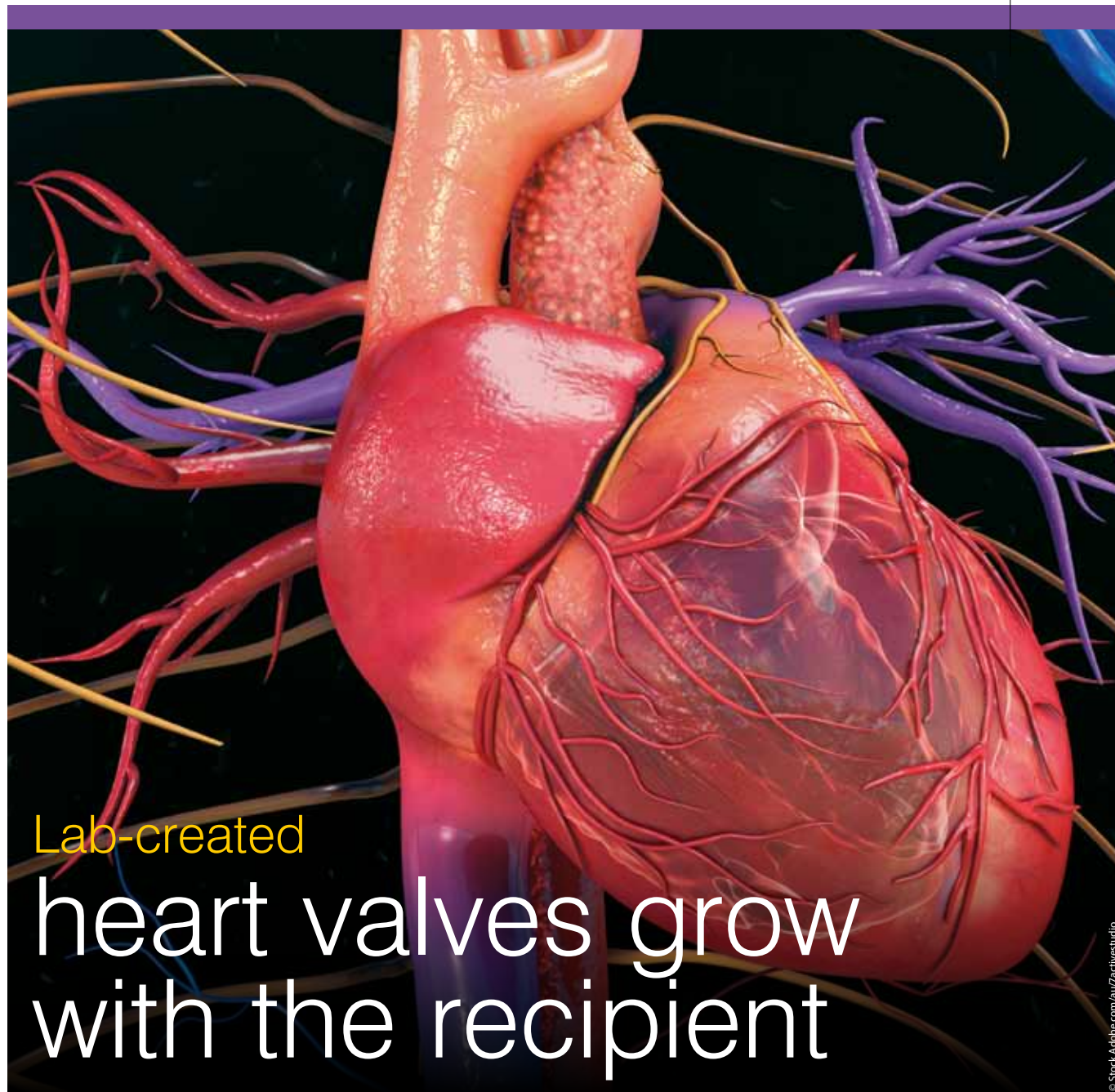
Operated by a digital controller, the product emits low noise as a result of an innovative rail system. With a maximum blending capacity of 400 mL, it can be used for 330–1620 mL bags. It also has an easily adjustable pedal distance and 10-level speed adjustment.

Additional features include a convenient door lever that is easy to open and close, a power stomaching mechanism and a diverse choice of bags. The pedal distance adjust function is designed to enable quick and precise sterile blending of samples.

Pacific Laboratory Products

www.pacificlab.com.au





Lab-created heart valves grow with the recipient

A groundbreaking new study led by the University of Minnesota, Twin Cities has shown for the first time that lab-created heart valves implanted in young lambs for a year were capable of growth within the recipient.

The valves also showed reduced calcification and improved blood flow function compared to animal-derived valves currently used when tested in the same growing lamb model.

Currently, researchers have not been able to develop a heart valve that can grow and maintain function for paediatric patients. The only accepted options for these children with heart defects are valves made from chemically treated animal tissues that often become dysfunctional due to calcification and require replacement because they don't grow with the child. These children will often need to endure up to five (or more) open heart surgeries until a mechanical valve is implanted in adulthood. This requires them to take blood thinners the rest of their lives.

Minnesota Professor Robert Tranquillo and his colleagues used a hybrid of tissue engineering and regenerative medicine to create the growing heart valves. Over an eight-week period, they used a specialised tissue engineering technique they previously developed to generate vessel-like tubes in the lab from a post-natal donor's skin cells. To develop the tubes, the researchers combined the donor sheep skin cells in a gelatine-like material, called fibrin, in the form of a tube and then provided nutrients necessary for cell growth using a bioreactor.

The researchers then used special detergents to wash away all the sheep cells from the tissue-like tubes, leaving behind a cell-free collagenous matrix that does not cause immune reaction when implanted. This means the tubes can be stored and implanted without requiring customised growth using the recipient's cells.



The next step was to precisely sew three of these tubes (about 16 mm in diameter) together into a closed ring. The researchers then trimmed them slightly to create leaflets to replicate a structure similar to a heart valve about 19 mm in diameter.

“After these initial steps, it looked like a heart valve, but the question then became if it could work like a heart valve and if it could grow,” Prof Tranquillo said. “Our findings confirmed both.”

This second generation of tri-tube valves was implanted into the pulmonary artery of three lambs. After 52 weeks, the valve regenerated as its matrix became populated by cells from the recipient lamb, and the diameter increased from 19 mm to a physiologically normal valve about 25 mm. The researchers also saw a 17 to 34% increase in the length

of the valve leaflets as measured from ultrasound images. In addition, researchers showed that the tri-tube valves worked better than current animal-derived valves, with almost none of the calcification or blood clotting that the other valves showed after being implanted in lambs of the same age.

“We knew from previous studies that the engineered tubes have the capacity to regenerate and grow in a growing lamb model, but the biggest challenge was how to maintain leaflet function in a growing valved conduit that goes through 40 million cycles in a year,” said Zeeshan Syedain, a senior research associate in Prof Tranquillo’s lab. “When we saw how well the valves functioned for an entire year from young lamb to adult sheep, it was very exciting.”

“This is a huge step forward in paediatric heart research,” Tranquillo said. “This is the first demonstration that a valve implanted into a large animal model, in our case a lamb, can grow with the animal into adulthood.”

If confirmed in humans, the new heart valves could prevent the need for repeated valve replacement surgeries in thousands of children born each year with congenital heart defects. The valves can also be stored for at least six months, which means they could provide surgeons with an ‘off the shelf’ option for treatment.

The study has now been published in the journal *Science Translational Medicine*, while the valve-making procedure has been patented and licensed to University of Minnesota start-up company Vascudyne. Prof Tranquillo said the next steps are to implant the tri-tube valve directly into the right ventricle of the heart to emulate the most common surgical repair and then start the process of requesting approval from the US Food and Drug Administration (FDA) for human clinical trials over the next few years.

“If we can get these valves approved someday for children, it would have such a big impact on the children who suffer from heart defects and their families who have to deal with the immense stress of multiple surgeries,” Prof Tranquillo said. “We could potentially reduce the number of surgeries these children would have to endure from five to one. That’s the dream.”

what's new

Rapid, precise and flexible dispensing

As researchers aim to maximise the efficiency and reproducibility of their applied genomics and drug discovery workflows, investments in liquid handling automation allow researchers to generate high-quality data with minimal hands-on time. Although traditional liquid handlers require automation expertise in order to properly automate a given workflow, PerkinElmer strives to deliver products that lower the barrier to automation by packaging the benefits of microlitre-scale liquid transfers in a plug-and-play device that runs from a simplistic touch screen.

The Flexdrop iQ Non-Contact Dispenser is designed to provide rapid, precise and flexible dispensing from up to 96-source positions into 96-, 384- or 1536-well plates with a dead volume of less than 1 μ L.

The FlexDrop iQ Non-Contact Dispenser facilitates reaction miniaturisation with sub-microlitre pipetting, while built-in drop-let verification should ensure experimental reproducibility. The platform is designed to provide any laboratory technician the means to precisely dispense as low as 8 nL by the push of a button, with the eight independent positive pressure channels for speed in mind. The technology should reduce the total volume of reagents required in many applications, such as drug discovery and NGS library workflows, and help reduce costs by minimising wasted reagents.

For research use only. Not for use in diagnostic procedures.

PerkinElmer Pty Ltd
www.perkinelmer.com



T cell kit for LNP-based mRNA delivery to T cells

The rapid development of COVID-19 vaccines using lipid nanoparticles (LNP) to encapsulate mRNA has demonstrated the power of LNP technology. This novel approach has opened up opportunities for the manufacture of gene-edited cell therapies and in vivo gene targeting.

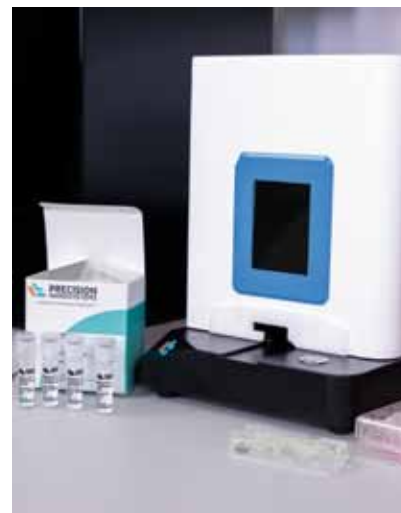
The GenVoy-ILM T Cell Kit for mRNA is a cell therapy reagent optimised for the delivery of mRNA into activated primary human T cells. Using LNPs designed to exploit endogenous uptake pathways, the method efficiently delivers mRNA into activated human primary T cells to mediate titratable, uniform protein expression levels with high cell viability. The kit enables a high proportion of T cells to be engineered, which should make it a more potent gene delivery method than electroporation.

Preparing mRNA-LNPs from the GenVoy-ILM T Cell Kit for mRNA is quick and simple. Formulated on the NanoAssemblr Spark instrument and cartridges, one preparation takes under 5 min to prepare. The resulting mRNA-LNPs are also compatible with established T cell culture media, allowing rapid integration into existing workflows.

The combination of non-disruptive mRNA delivery technology and seamless integration with cell culture protocols eliminates cell recovery times post-treatment to accelerate the production of T cell therapies.

ATA Scientific Pty Ltd

www.atascientific.com.au



Redefining peristaltic pump technology for single-use downstream bioprocessing

- Flow linearity to 20 L/min at 3 bar
- Trace pulsation of ± 0.12 bar
- Ultra-low shear
- Single-use technology with class-leading validation



Quantum

ReNu
SU TECHNOLOGY

wmftg.com/Quantum-au
1300 962 7867 / enquiries@wmftg.com.au

**WATSON
MARLOW**

Fluid Technology Group

IMMUNOPRECIPITATION WITH NANO-TRAPS

GFP-Trap® and RFP-Trap® are well established high quality tools for the fast, reliable and efficient one-step isolation of green and red fluorescent fusion proteins and their interacting factors. **Nano-Traps** are used for:

- Pulldowns/Immunoprecipitations
- ChIP/RIP Analysis
- Mass Spectrometry
- Enzyme Activity Measurements

Nano-Traps consist of single polypeptide chain coupled to an immobilising matrix (agarose beads, magnetic particles, magnetic agarose beads or multiwell plates). These Nano-Traps have excellent binding properties and are produced with constant high quality without batch-to-batch variations.

GFP-Trap®, RFP-Trap® and Spot-Trap® are now available coupled to **Dynabeads™**

- GFP-Trap® Dynabeads and RFP-Trap® Dynabeads are highly recommended when very large proteins/complexes are investigated, and magnetic separation is needed for IP. The Nano-Traps are comprised of GHP/RFP V_HH/Nanobodies coupled to Dynabeads™
- Spot-Trap® Dynabeads are affinity beads for IP of Spot-tagged proteins. It is comprised of an anti-Spot-Tag® V_HH/Nanobody coupled to Dynabeads™

NEW iST GFP-Trap Kit for IP/ Co-IP of GFP-fusion proteins & sample preparation for mass spectrometry (MS).

Applications/Advantages:

- Identification of GFP-fusion proteins & interacting partners by MS
- Interactome studies
- Superior processing of IP samples into clean peptide mixtures
- Intuitive protocol for reproducible results

Other members of the Nano-Trap family:

- | | |
|-------------------|----------------------|
| • Halo-Trap | • p53-C-term-Trap |
| • MBP-Trap | • p53-N-term-Trap |
| • Mdm4/HdmX-Trap | • PARP1-Trap |
| • MK2-Trap | • SNAP/CLIP-tag-Trap |
| • mNeonGreen-Trap | • Spot-Trap |
| • Myc-Trap | • TurboGFP-Trap |

Note: Dynabeads™ is a registered trademark of Life Technologies Corporation, a part of Thermo Fisher Scientific Inc.

Experience the Alpaca Antibody Advantage

BioNovus
• LIFE SCIENCES •

Ph: (02) 9484-0931 | Fax: (02) 9980-2162
Email: info@bionovuslifesciences.com.au
www.bionovuslifesciences.com.au

what's new

Super-resolution functionality for conventional fluorescence microscopes

SRRF-Stream+ from Andor is a real-time super-resolution microscopy functionality that operates exclusively on

Andor's iXon Life, iXon Ultra EMCCD cameras and Sona back-illuminated sCMOS cameras.

Developed in conjunction with the Ricardo Henriques Lab at UCL, SRRF-Stream is a useful way to unlock powerful super-resolution images from conventional fluorescence microscopes and a large step towards Andor's vision that super-resolution microscopy should be widely and easily accessible to all.

With final resolution of 50–150 nm, the product features real-time viewing in Live Mode with no post-processing. Prolonged live-cell observations are possible with low excitation, and conventional fluorophores have simple labelling and no photoswitching. With live cell dynamics, full FOV images are available every 1–2 s at >10 fps with small ROIs.

Coherent Scientific Pty Ltd
www.coherent.com.au



Imaging system with deep learning technology

The recently released ImageXpress Confocal HT.ai High-Content Imaging System utilises a seven-channel laser light source with eight imaging channels to enable highly multiplexed assays while maintaining high throughput by using shortened exposure times.

Water immersion objectives improve image resolution and minimise aberrations so scientists can see deeper into thick samples. With high excitation power, the ImageXpress Confocal HT.ai is designed to provide increased signal and shorter exposure times, generating up to a two-fold boost in acquisitions of 3D samples. A micro-lens enhanced spinning disk confocal provides a flat field of view for reproducible image analysis.

The powerful combination of MetaXpress and IN Carta software should simplify workflows and reduce analysis time from hours to minutes with multi-threaded, parallel processing, for advanced phenotypic classification and 3D image analysis with machine learning capabilities and an intuitive user interface.

Bio-Strategy Pty Ltd
www.bio-strategy.com



Automated robotic system for endotoxin testing

Lonza has announced an expansion to its PyroTec PRO automated robotic system for endotoxin testing. The PyroWave Reader add-on has been designed specifically for use with the sustainable PyroGene Recombinant Factor C (rFC) Assay. This brings a third test type option to the platform, allowing QC microbiologists to choose the endotoxin test method best suited to their testing needs. The PyroTec PRO, now compatible with Lonza's PYROGENT-5000 Turbidimetric LAL (Limulus Amebocyte Lysate) Assay, Kinetic-QCL Chromogenic LAL Assay and PyroGene rFC Assay, therefore expands the options available for streamlined, automated endotoxin testing.

The PyroGene rFC Assay is an animal-free method for endotoxin detection that works through a single enzymatic step. It has been shown to be equivalent to other photometric endotoxin methods that use LAL to detect endotoxins according to the parameters listed in the USP chapter <1225> 'Validation of Compendial Procedures'. These parameters include linearity, specificity, precision, accuracy and limit of detection.

The need for dependable endotoxin testing technology continues to grow, especially with the pharmaceutical industry increasingly focusing on the development of innovative biotherapeutics that carry a higher risk of endotoxin contamination. Through process optimisation and automation of routine manual tasks, the PyroTec PRO is designed to help users streamline and improve the performance of the QC laboratory, increasing lab efficiency and productivity. Automated endotoxin testing can also reduce the potential for human error. Able to easily accommodate different assay types in the same run, and powered by the WinkQCL Endotoxin Analysis Software, the complete system should further increase the efficiencies and data integrity gained from automated endotoxin testing.

Lonza Australia Pty Ltd
www.lonza.com



**For All Your
Specialty/Scientific
Gas Needs**

- SupaLaser Gases ▪ MAP Gases
- Pure Gases & Gas Calibration Mixtures
- Dry Ice

FREE DELIVERY
FOR MOST AREAS

13 SUPA
13 78 72
supagas.com.au

SUPAGAS
YES WE CAN!



Thermal flow switch enables COVID-19 vaccine production

The FLT93C sanitary thermal flow switch, manufactured by Fluid Components International (FCI) and distributed by AMS Instrumentation & Calibration, is helping a major pharmaceutical company ensure the necessary high quality of its rinse water for injection (WFI) is maintained on its batch lines during the production of the COVID-19 vaccine.

The FLT93C is a dual-function instrument that indicates both flow and temperature and/or level sensing in a single device, with dual 6 A relay outputs independently configurable to flow, level or temperature. Based on FCI's thermal dispersion expertise, the switch's sensor technology enables high-performance capabilities, including liquid level resolution of ± 2.5 mm with repeatability of ± 1.3 mm and standard temperature accuracy $\pm 1^\circ\text{C}$ with repeatability is $\pm 0.6^\circ\text{C}$ (improved temperature accuracy is available with factory calibration). FCI's FlexSwitch technology can be packaged in integral or remote configurations for installation flexibility.

In the pharmaceutical industry, WFI is high-quality water used to produce a wide variety of injectable medicines, including the COVID-19 vaccine. On the COVID-19 vaccine production lines, WFI is used for rinsing after batch production, and it must be maintained at a temperature of 20 to 85°C. FLT93C sanitary thermal flow switches are utilised to confirm the minimum flow rate of the measured WFI within the specified temperature range during production; a minimum flow at the correct temperature and time is required to rinse the COVID-19 vaccine production lines to ensure that these lines are clean and free from bacteria or leftover ingredients from the previous batch.

After a batch of vaccine is complete, the cleaning process begins and the switch then issues a liquid low flow alarm to indicate the line can be released to start the next batch of vaccine production. The sanitary flanges designed for the switch support a

clean and safe installation of the instrument in the production process, which is critical to produce safe, effective COVID-19 vaccine.

Designed with temperature compensation technology, the FLT93C is claimed to be the industry's only thermal switch that ensures setpoint accuracy for process temperatures that can vary up to 177°C. It is easily field-configured or factory preset, providing flexibility and stability for all multiple process sensing and switching requirements.

The flow switch is suitable for 19.05 to 101.6 mm sanitary tubing process lines, and it connects with a secure tri-clamp fitting for easy removal for inspection and servicing. The 316L stainless steel wetted materials are available in both mechanical polish (SF0 to SF3) and electro-polish (SF5 and SF6) surface finishes with 20 Ra maximum (μin) finish; 10 Ra maximum (μin) electro-polish finish (SF 4) is available on request. Construction complies with ASME BPE requirements.

The switch is available with a choice of sensors, including one that is suitable for process temperatures up to 177°C and one that is suitable for temperatures up to 260°C. In addition to clean-in-place (CIP) systems, other pharmaceutical uses of the flow switch include compendial water systems (WFI, PW and HPW) and solution preparation systems (buffer solution). Options are available for applications requiring more corrosion-resistant, wetted materials such as Hastelloy C and Zone 1/21 (Class 1, Div 1 and 2) hazardous areas.

"We are extremely proud of the role our sanitary flow switch products are now playing in fighting coronavirus disease," said FCI President Dan McQueen. "Our dedicated, innovative employees have been exceptional in assuring that we can continue to produce and deliver our flow instruments to customers in the pharmaceutical, food/beverage, energy and other essential industries around the globe."

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au

The S-Monovette® is the revolution in blood collection.

The S-Monovette is an innovative enclosed blood collection system that allows the user to draw blood from the patient using the syringe or vacuum method, uniting the advantages of both techniques in a single product.

When used as a syringe, the phlebotomist has full control over the speed at which the blood is drawn into the tube. This is particularly useful for patients with fragile veins, such as the very young or elderly, where the use of the aspiration technique prevents even the most fragile veins from collapsing. When the tube has been filled, the plunger is simply snapped off to leave a primary sample tube which can be centrifuged and is compatible with all major analysers.

The S-Monovette can also be used as an evacuated tube by drawing the plunger fully down and snapping it off immediately

prior to blood collection. This creates a fresh vacuum and ensures a precise filling volume, ensuring a correct dilution ratio.

The reduced vacuum pressure in the S-Monovette drastically reduces the rate of haemolysis and vein collapse, meaning increased sample quality and reduced costs associated with repeat collections. Furthermore, unlike pre-evacuated tubes, the S-Monovette does not have to hold a vacuum for many months after manufacture, which allows the membrane stopper to be thinner and more easily penetrated by the needle sheath. This minimises the movement of the needle in the vein when attaching the tube, ensuring optimum patient comfort.

The S-Monovette needle is ready to use so that there is no need for assembly to

a holder. The needle is of a compact, low profile design, which reduces the chance of haematoma by allowing for a reduced angle of puncture and eliminates the possibility of needle stick injury caused by assembly of the needle and holder. The compact design also results in approximately one sixth of the sharps volume caused by using a pre-evacuated system, giving significant cost savings.

If you would like a visit from one of our Sales Representatives to demonstrate this system, please contact us on **toll free 1800 803 308**.



Sarstedt Australia
www.sarstedt.com

Say STOP to haemolytic samples



S-Monovette®
 The blood collection system proven to reduce haemolysis*



S-Monovette®

Minimises haemolysis rates



Reduces repeated blood collection



Patient friendly!
Cost- and time-saving!

* Lippi et al. Prevalence of haemolysis in blood samples collected from intravenous catheters. Clin Biochem 2011;46(10):1-104



info.au@sarstedt.com - www.sarstedt.com

Sarstedt Australia - 15 Park Way, Mawson Lakes SA 5095 - Phone: 1800 803 308



Centrifuge with touchscreen interface

The Centrifuge 5910 Ri has been designed to simplify daily centrifugation tasks. The user interface was developed for ease of operation, including switching between programs and rotors. Setting parameters can be done in seconds via the favourites function and up to 99 frequently used programs are directly accessible on the home screen. With documentation features and the customised reminder function, the Centrifuge 5910 Ri is designed to offer a seamless user experience.

The temperature management system is designed to offer the latest in cooling technology, including rapid pre-cooling and patented Dynamic Compressor Control (DCC) technology that maintains a steady temperature throughout the run to protect valuable samples. Additional safety features such as automatic rotor recognition, built-in imbalance sensors and a motor-driven lid lock should ensure peace of mind.

The 5910 Ri has a high capacity of up to 4 x 1 L per run and speeds up to 22,132 x g. It also offers versatility with the choice of 10 rotors and a comprehensive range of fixed-angle and swing-bucket rotors to suit a broad spectrum of applications. The most versatile rotor, the S-4xUniversal, accommodates tubes, plates and bottles in just one bucket with the Universal adapter concept — designed to save the user time, space and money. Additionally, the centrifuge can be connected to the VisioNize digital lab space as it comes with VisioNize on board.

Eppendorf South Pacific Pty Ltd
www.eppendorf.com.au



Fluorescent cell counter

The Cellometer K2, powered by Matrix software, utilises brightfield imaging and dual-fluorescence imaging to quickly identify and count individual cells. Cell count, concentration, diameter and percentage viability are automatically calculated and reported.

The Cellometer K2 can be customised to handle a variety of cell types, including primary cells, tumour digest, insect cells, cell lines, fragile cells and more, at low or high concentrations. It is designed to take the guesswork out of setting up cell quantification experiments.

The product comes with frequently used assays and cell types with predefined settings to enable consistent results from sample to sample. Users can easily build custom assays and cell types to fit their experimental needs.

The cell counter includes predefined reports and the ability to create new ones with graphs, images, charts and tables.

Thermo Fisher Scientific
thermofisher.com

Leader in Low Flow Fluidics Handling Technology



- Flow ranges for gases from 0 - 0,7 mL/min up to 0 - 11000 m³/h
- Flow ranges for liquids from 0 - 100 mg/h up to 0-600 kg/h
- Pressure ranges from 0 - 100 mbar up to 0 - 400 bar
- Laboratory, industrial (IP65), Class I Div. 2 or ATEX approved design
- Analog, RS232, FLOW-BUS, PROFIBUS DP, PROFINET, DeviceNet™, Modbus, EtherCAT®

Bronkhorst®

www.bronkhorst.com - www.ams-ic.com.au

AMS



VIS and UV-VIS spectrophotometers

The Lovibond XD series spectrophotometers are equipped with reference beam technology, used for the analysis of water-based solutions in the UV and UV-VIS wavelengths.

They are suitable for the analysis of wastewater, drinking water, pool water and galvanisation. Additional functions include measurement of transmission and absorption, spectra-scan and kinetic analysis, as well as user-defined methods using various wavelengths.

The spectrophotometers offer over 150 pre-programmed methods based on the Lovibond reagents. Some features include automatic test recognition with internal barcode reader, as well as automatic cuvette-type recognition. The instruments also support Good Laboratory Practice (GLP) and standard procedures for analytical quality assurance.

The series supports password security and allows up to three different access levels. Approximately 5000 datasets can be stored and managed via various interfaces such as Ethernet, USB, keyboard, barcode scanner and printers.

Labtek

www.labtek.com.au

Automatic live-cell imaging system

Capturing live-cell images is an important process in the study of cell interactions, biological function and cellular dynamics. Performing this work manually is time-consuming and technically challenging. To facilitate automation of the process, Curiosis has launched a range of user-friendly automated live-cell imaging systems: the Celloger series.

The Celloger Mini is an automated live-cell imaging system based on bright-field microscopy with fully motorised stages for capture of repeated images at multiple locations. The auto-focus function produces sharp images and regular imaging allows researchers to observe cell morphology in real time. The system is compatible with various cell vessel types that users can choose from based on their research protocol, and multi-position imaging is possible with up to 96 wells.

By monitoring function, cell morphology can be observed in real time for more than 14 days. Multi-position capture provides more meaningful results for a target location than single-point imaging, the company says.

The Celloger Mini fits easily into a standard CO₂ incubator and uses bright-field technology to provide high-quality images and time-lapse videos needed for cell-based research workflows and applications such as wound healing assay, cell proliferation, cytotoxicity assay, confluency and growth curve data.

Capella Science

www.capellascience.com.au



PROTECTING BIOPHARMA MANUFACTURING... ALL NEW **PURE-GARD** SANITARY PRESSURE RELIEF

elfab pressure intelligence



- **PURE-GARD** FOR CLEANABILITY
 - CREVICE AND DIMPLE FREE DESIGN
- **PURE-GARD** FOR STRUCTURAL STABILITY
 - ONE PIECE ASSEMBLY PROTECTS THE DISC
 - ALLOWS FOR MINOR PIPE MISALIGNMENT
- **PURE-GARD** FOR EXTENDED PRODUCT LIFE
 - ALLOWS FOR REGULAR GASKET CHANGES
- **PURE-GARD** IS TAG FREE
 - ALL TECHNICAL DETAILS ETCHED ON BODY
- **PURE-GARD** HAS OPTIONAL BURST DETECTION

PURE-GARD: 1"–4" Ø 40 – 300 psig

PURE-GARD SOLO: 1"–8" Ø 18 – 75 psig



AUSTRALIAN AGENT & TECHNICAL SUPPORT

WE HANDLE PRESSURE®



PRESSURE & SAFETY SYSTEMS

Tel: (03) 9699 7355

www.pressureandsafety.com.au

950#ASS-PHARMA

Cell transfection platform

Lonza's Nucleofector technology is a non-viral cell transfection method that can be used even for hard-to-transfect cells, such as primary cells and pluripotent stem cells. Now, with an updated core unit and more intuitive software, the next-generation 4D-Nucleofector platform is designed to deliver flexibility and high performance with greater ease of use.

Electroporation is an important tool with a range of applications in disease research and drug discovery, as well as in the advancement of gene therapies, immunotherapies and stem cell generation. Nucleofector technology achieves high transfection efficiency in union with high cell viability by providing electrical pulses, cell type-specific solutions and optimised protocols to achieve an electroporation approach that targets the cell's nucleus directly. This leads to fast, reproducible and efficient results.

The 4D-Nucleofector core unit can operate up to three functional modules, allowing for tailored experimental set-ups and facilitating scale-up from low- to high-volume transfection. The family is now joined by a fully integrated 96-well unit to suit users with mid-scale transfection requirements for up to 96 samples at once. In addition, the updated core unit features an 8" touchscreen display, enabling users to easily set up their experiments and control all functional modules via the system's intuitive and user-friendly software. Optimised protocols are available for more than 750 different cell types and are designed to provide robust transfection conditions, which should lead to optimal results.

Small-scale protocols can be transferred to a larger scale without the need for reoptimisation, bringing together small- and large-scale transfection applications in a single system. Users can therefore achieve high transfection efficiencies with the knowledge that their protocols can be scaled as needed.

Lonza Australia Pty Ltd

www.lonza.com



Safe-change HEPA filter containment housings

The Camfil CamContain CS is a fully customisable safe-change HEPA filter containment housing designed specifically for pharmaceutical, biotechnological, nuclear or BSL-3/BSL-4 facilities seeking high performance within critical applications.

Each welded (gas-tight), torsion-resistant stainless steel housing conforms to the tightness class required by nuclear power stations — DIN 25496, Table 3. Manual or pneumatically operated particulate and clean gas isolation valves have been designed to meet the highest tightness requirements, conforming to global standards DIN 3230 T3 BO BN (leakage rate 1), ISO 5208, Category 3 and ANSI B 16-104, Class V.

Inbuilt safe-change service systems enable easy and safe filter installation utilising bag-in/bag-out (BIBO) procedures. Safety measures allowing easy and safe filter installation include an intelligent decontamination concept, an innovative filter tensioning mechanism preventing the contamination of the service bag and hatch and a robust frame with pneumatic tension release and a centrally guided filter slide-in mechanism.

Custom HEPA filter test sections are available to measure the overall efficiency or allow for annual NATA-accredited HEPA integrity testing.

Camfil Australia Pty Ltd

www.camfil.com.au

Polymer dyes

Beckman Coulter Life Sciences introduces next-generation polymer dyes to bring cutting-edge science to clinical research. Supernova dyes are a novel range of polymer dyes designed to be brighter than conventional fluorochromes. SuperNova conjugated antibodies deliver brightness for flow cytometry staining and, due to their proprietary formulation, generate limited nonspecific staining to help maximise confidence in results.

The first dye to appear, the SuperNova V428 (SN v428), is suitable for assessing dimly expressed markers. A brighter alternative to Pacific Blue (~10x brighter on average), it has been optimally excited by the violet laser (405 nm). With an excitation maximum of 414 nm and an emission peak of 428 nm, it is detectable with a 450/50 bandpass filter (or equivalent).

Beckman Coulter Australia

www.beckman.com.au



TechNote Focus: Direct aqueous analysis of pesticides and PPCPs in drinking and bottled water at ppt levels

Jianru Stahl-Zeng, Bertram Nieland, Phil Taylor, Jack Steed, Ian Moore, Ronny Bosch, Bernard Bajema

Using the SCIEX Triple Quad™ 7500 LC-MS/MS System — QTRAP® Ready

Introduction

Drinking water analysis is subjected to extremely low and rigid prescribed consent values (PCV) for determinands. Water suppliers and utility companies need to ensure that the final water product they send out for bottling or into supply networks is safe and complies with state and country regulations. Water can be a challenging matrix, in particular if it is sourced from a river, lake or reservoir before entering the water treatment process. Laboratories which serve the water companies must have highly sensitive instrumentation to quantify beyond PCV limits with precision and confidence and be able to handle all the matrix challenges.

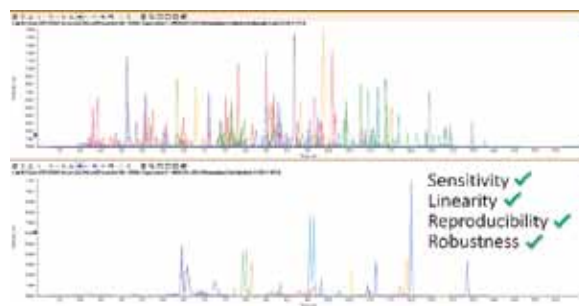
In this technical note brought to you by SCIEX, a series of experiments were conducted in collaboration with Vitens Water Company, to test several types of water samples spiked with a mixed standard of 431 determinands, including pesticides, pharmaceuticals, and personal care products (PPCPs). This work explores the sensitivity levels of the SCIEX Triple Quad 7500 LC-MS/MS System — QTRAP Ready, the reproducibility of the acquired data as well as the simplicity of data processing using SCIEX OS Software.

Methods

Sample preparation

Direct aqueous injection of spiked water samples — MilliQ water, tap water (SCIEX

Figure 2. All 431 compounds optimized for analysis with fast positive and negative switching. Extracted ion chromatograms (XIC) show the positive mode compounds (top) and the negative mode compounds (bottom).



Concord Laboratory), Evian bottled water and Fiji bottled water. The samples were spiked with a custom mix standard provided by Vitens, Netherlands, containing 431 analytes, include 46 internal standards. A series of 12 standards were made in the respective matrices at sequential concentrations from 0.1 to 500 ng/L. A collection of unknown blank samples was also included in this study.

Due to the broad range of compounds analyzed in this study, polarity switching was used to maximize compound coverage. The speed of polarity switching ensured that very good peak sampling was obtained for all analytes, with sufficient data points across the LC peak (Figure 2).

Key features of the SCIEX 7500 System for drinking water analysis:

- Very high sensitivity demonstrated — Ready for sub part per trillion detection limits for analytes in drinking water

- Includes improvements in the generation of ions with the OptiFlow® Pro Ion Source and the E Lens™ Technology and the capture of ions with the D Jet™ Ion Guide
- Simple sample preparation strategy of direct aqueous injection streamlines the water analysis workflow
- SCIEX OS Software is a single platform for data acquisition, data processing and streamlined results review
- QTRAP Ready system future proofs the lab with an easy upgrade path to obtain the qualitative functionality of the linear ion trap scan features

Conclusions

SCIEX Triple Quad 7500 LC-MS/MS System — QTRAP Ready has demonstrated its potential for low-level quantification (parts per trillion detection limits) across a relatively large suite of 431 determinands with robustness and scope for expansion.

For the full technical note which includes extra methods details, data and references, please visit: <https://sciex.li/PPCP7500>

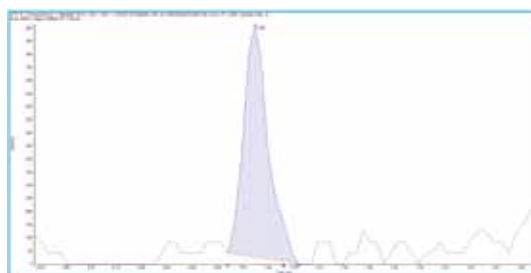


Figure 1. SCIEX 7500 System with an example of Chloramphenicol spiked in Fiji mineral water at 0.1 ng/L. This direct aqueous injection analysis removes the need for laborious sample preparation.



AB Sciex Australia Pty Ltd
www.sciex.com



Tensiometer for surface research

The Theta Flow from Attension is a contact angle meter that is designed to integrate a high level of automation to simplify measurements and increase accuracy. With its high-end camera, image enhancement technology and built-in sensors, the product builds on the Theta

Flex, which was a recipient of the Red Dot award in 2020 for its neat design and ease of use.

The tensiometer offers three main benefits that are not believed to be available on other systems. Camera autofocus, automatic surface mapping and automatically generated results are some of the automation features that should help simplify measurements and improve accuracy. A high-resolution 5 MP camera combined with DropletPlus technology enables image enhancements.

Fully integrated tilt and level sensors help keep track of the surrounding environment and, together with temperature and relative humidity sensors, are designed to ensure traceable data. The touch display meanwhile assists users by simplifying the measurement set-up; everything from filling the liquids to changing samples can be done easily from the instrument in seconds.

Defining baselines is a critical aspect of measuring contact angles which requires the droplet in focus and the substrate well exposed. When substrates have large depth or the surface is not uniform, the substrate surface is often darkened and the contact area obscured. The Theta Flow's autofocus function, together with the DropletPlus image enhancer algorithm, is designed to improve the chances of correct baseline placement, particularly for challenging samples.

High-end features make the Theta Flow suitable for surface measurements such as static contact angle, dynamic contact angle, surface free energy, surface and interfacial tension, roughness-corrected contact angle and 3D surface roughness, and interfacial dilatational rheology.

ATA Scientific Pty Ltd

www.atascientific.com.au

Cleanroom-compatible CO₂ incubator

The Thermo Scientific Heracell VIOS CR CO₂ incubator is a third party-certified, cleanroom-compatible CO₂ incubator, suitable for use in ISO Class 5 and GMP Grade A/B environments.

The Heracell VIOS CR CO₂ incubators — CTS Series are designed to meet the needs of today's labs generating rapid-fire discoveries. Known for optimal cell growth conditions and minimal contamination risk, they are designed to keep projects moving. Manufactured with the same high quality as Thermo Scientific laboratory equipment, the incubators provide innovation for the cleanroom.

Microbial contamination is a constant risk for cultured cells; Heracell VIOS CR CO₂ incubators are designed for contamination control. From the in-chamber ISO Class 5 HEPA filtration system to the covered, protected humidity reservoir and the electropolished interior to the automated on-demand 180°C sterilisation cycle with efficacy proven according to international pharmacopeias, the user's cultures should be protected from every direction.

The CO₂ incubators are available in 165 and 255 L in a compact footprint, readily stackable with a choice of electropolished stainless steel or 100% copper interior.

Thermo Fisher Scientific

thermofisher.com



EXPLORE MORE TARGETS WITH

A\$65 Trial Size Antibodies

- Tested using endogenous expression in tissues and cell lines
- Knockdown/knockout validation to demonstrate specificity
- Extensive in-house validation in WB, IHC, IF and more



Browse
the full range at

www.ptglab.com

or contact our local partner
United Bioresearch
02 4575 0309

Understanding measurement uncertainty

No measurement can be made with 100% accuracy. There is always a degree of uncertainty, but for any important measurement, it is essential to identify every source of uncertainty and to quantify the uncertainty introduced by each source. Here we provide an overview of the importance of measurement uncertainty and explain the difference between accuracy and precision.

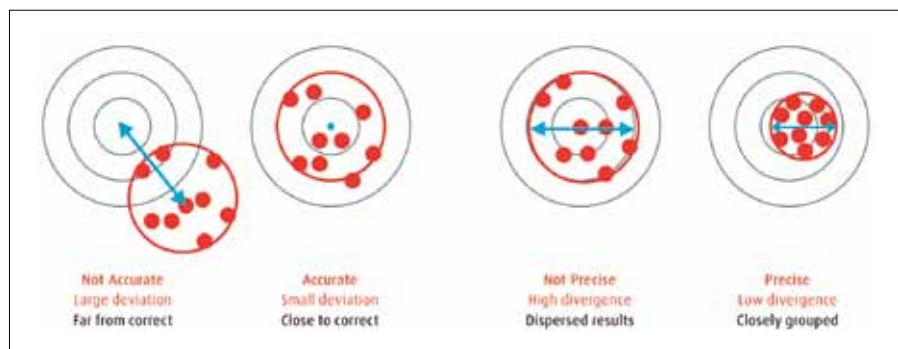
M easurement provides quantitative information about the properties of an object, substance or process. Some measurements are simple, referring to only one attribute such as size, mass, temperature or speed. Others can be extremely complex, such as determining the amount of each individual gas in a multi-component gas mixture.

In every field of commerce and industry, buyers require certified measurements to

give them assurances of the quality of goods supplied; for example, the tensile strength of steel, the purity of a drug or the heating power of natural gas.

Suppliers rely on test laboratories, either their own or third parties, to perform the analysis or measurement necessary to provide these assurances. Those laboratories in turn rely on the accuracy and precision of their test instruments, the composition of reference materials, and the rigour of their procedures to deliver reliable and accurate measurements.

Every stage of the process, every measurement device used, introduces some



uncertainty. Identifying and quantifying each source of uncertainty to present a test result with a statement quantifying the uncertainty associated with the result can be challenging. But no measurement is complete unless it is accompanied by such a statement.

Measurement uncertainty is critical to risk assessment and decision-making. Organisations make decisions based on measurements. The more uncertain they are about the accuracy and precision of those measurements, the bigger the risks associated with those decisions.

Good measurement practice means identifying all possible uncertainties, determining their importance, estimating the degree of uncertainty, taking the steps necessary

to reduce overall uncertainty to acceptable limits, and reporting the degree of uncertainty associated with a measurement.

Measurement error is not the same as uncertainty. When a device to be calibrated is compared against a reference standard, the difference is an error, but that error is meaningless unless the uncertainty associated with that measurement can be determined.

There are three components to estimating uncertainty:

1. Identifying and quantifying the effect of any environmental factors that can affect the accuracy of measurement.
2. Estimating the accuracy of the measuring equipment or material.

3. Estimating the uncertainties in taking the measurement

Accuracy and precision are terms often interchanged, but they are not synonymous. There are uncertainties associated with both the accuracy and precision of measurements, so it is important to understand the distinction.

Accuracy is the closeness of a measurement to the true value of the property being measured.

Precision is a measure of how close repeated measurements are to each other, when there is no change in the property being measured. It is perfectly possible to achieve very high precision with considerable inaccuracy: a large number of very similar measurements could be way off the mark if there were some aspect of each measurement introducing a similar level of inaccuracy, such as a wrongly calibrated instrument.

Only by identifying and quantifying all the uncertainties in a measurement — in its precision and its accuracy — can there be any estimate of the accuracy of a group of multiple measurements, no matter how close they are to each other.

BOC Limited
www.boc.com.au

what's new

NIR analyser for meat products

Routine testing of meat products is made easy utilising the DA 6200 NIR analyser. Users can monitor incoming meats, in-process blends and finished products for fat, moisture and protein in seconds, not hours like traditional chemical methods. The real-time results allow meat manufacturers to make on-the-go quality decisions to improve the consistency and quality of finished products.

Supplied calibrated and ready to use, the lightweight, compact and battery-operated DA 6200 NIR analyser can be used anywhere on the production floor or back in the in-house laboratory. The instrument uses robust solid-state diode-array NIR technology and has no moving optical components to provide ongoing operation, precise measurements and optimal uptime. Using the magnetic coupled plastic cups allows a large representative sample of homogenised meat to be analysed easily. Results for each chemical test are displayed on the screen of the analyser without any further calculations to be carried out by the operator.

The DA6 200 NIR analyser has been approved by AUSMEAT for the determination of Chemical Lean in meat products.

Australasian Medical & Scientific Ltd
www.amsl.com.au



LC systems

The PerkinElmer LC 300 platform and SimplicityChrom software bring together advanced high-performance liquid chromatography (HPLC) and ultrahigh-performance liquid chromatography (UHPLC) capabilities with intuitive instrument control and powerful data analysis.

Designed to deliver ultraprecise gradient flows and low levels of dispersion, the LC 300 HPLC system offers both binary and quaternary high-pressure pump systems to deliver fast chromatography results.

The system's autosampler features a built-in column oven and a high-visibility, colour LCD screen displaying key status results without having to log into chromatography data system (CDS) software. Furthermore, the versatile platform features five high-sensitivity detector options and drivers to support third-party commercially available chromatography software such as OpenLab, Chromeleon and Empower.

The LC solution comes complete with innovative software. Built with the user in mind, the PerkinElmer SimplicityChrom CDS software delivers intuitive and customisable workflows aimed at enhancing productivity and streamlining result analysis. It provides the tools needed to ensure 21 CFR Part 11 compliance, which should help save time, effort and money.

Whether the user is testing food additives, potency in cannabis or drug excipients, the PerkinElmer LC 300 solution is designed to provide labs with the speed, power and simplicity they want, and the sensitivity and accuracy they need, to meet consumer expectations and regulatory demands.

PerkinElmer Pty Ltd
www.perkinelmer.com



LIEBHERR

ULTRA LOW SAFE STORAGE NEW FROM LIEBHERR

Peace of Mind Protection from -40°C to -86°C

- SAFE and RELIABLE Long term storage of biological products, vaccines and chemical reagents as low as -86°C
- Exceptionally low energy consumption
- Available in 500 and 700 litre configurations
- Backed by Liebherr's world-renowned German Engineering and state-of-the-art refrigeration technology

home.liebherr.com.au



By altering the pH of the suspensions, the NUS researchers demonstrated the ability of the 2D electrolyte sheet to roll up into a scroll-like arrangement.

2D electrolytes: a new type of intelligent material

Intelligent materials can adapt their properties depending on changes in their surroundings and can be used in everything from self-healing mobile phone screens to shape-shifting aeroplane wings and targeted drug delivery.

Now, researchers from the National University of Singapore (NUS) have created an intelligent material that has the structure of a two-dimensional (2D) material but behaves like an electrolyte — and it could be a new way to deliver drugs within the body.

Just like traditional electrolytes, these '2D electrolytes' dissociate their atoms in different solvents, and become electrically charged. Furthermore, the arrangement of these materials can be controlled by external factors, such as pH and temperature, which is ideal for targeted drug delivery. The 2D electrolytes also show promise for other applications that require a material to be responsive to environmental changes, such as artificial muscles and energy storage.

The team behind the 2D electrolytes comprised NUS researchers from the university's Centre for Advanced 2D Materials (CA2DM), Department of Physics and Department of Materials Science and Engineering. Their results have been published in the journal *Advanced Materials*.

Changing the behaviour of 2D materials

In materials science, a 2D material is a solid material that exists in a single layer of atoms. It can be thought of as an atomically thin sheet that has a specific height and width, but effectively no depth; hence, it is essentially two-dimensional. On the other hand, an electrolyte is a substance that produces an electrically conducting suspension when dissolved in a solvent, such as water.

There are numerous 2D materials in existence today, and electrolytic behaviour has been well established in countless other compounds. However, the results from the NUS researchers show the first instance of materials that have both 2D structure and properties of electrolytes, with a particular trend to shapeshift their form reversibly in liquid medium. The team achieved this feat by using organic molecules as reactive species to add different functionalities to 2D materials such as graphene and molybdenum disulfide (MoS_2).

A major breakthrough of the research was that the orientation of the 2D electrolytes could reversibly change by tweaking the external conditions.

“By adding different chemical groups that become positively or negatively electrically charged in solvents, we altered traditional 2D materials and came up with a novel class of smart materials that have their electronic properties controlled by morphological conformation,” explained Professor Antonio Castro Neto, Director of CA2DM and leader of the study.

From a flat sheet to a rolled-up scroll

A major breakthrough of the research was that the orientation of the 2D electrolytes could reversibly change by tweaking the external conditions. Currently, the electrical repulsion between the surface charge in a 2D material leads to it being laid out in a flat sheet. By altering the pH, the temperature or the ionic concentration of the suspensions, the researchers demonstrated the ability of the 2D electrolyte sheet to shapeshift and form scroll-like arrangements. These experimental results are supported by detailed theoretical analysis in which they explain the physical mechanism behind the scroll formation and stability.

These scroll orientations have such a small diameter that they could be described as one-dimensional (1D), leading to different physical and chemical properties. Moreover, this transition from 2D to 1D is reversible by altering the external conditions back to their original values.

“One can think of 2D electrolytes as the higher dimensional analogues of 1D electrolytes, commonly known as polyelectrolytes,” said Prof Castro Neto. Important examples of polyelectrolytes include many biologically relevant materials, such as DNA and RNA.

“When acids, bases or salts are added, these electrically charged polymers also undergo conformational transitions from molecular chains that are 1D to globular objects of 0D, and vice versa. Our 2D electrolytes, in analogy with polyelectrolytes, show reversible transitions from 2D to 1D, as a function of external factors. As stimuli-responsive materials, they are suitable for the creation of cutting-edge technology.”

Next steps

Discovering this class of materials has opened up new areas of exploration for materials scientists. As noted by Prof Castro Neto, “There is an uncountable number of ways to functionalise graphene and other 2D materials to transform them into 2D electrolytes. We hope that our work will inspire scientists from different fields to further explore the properties and possible applications of 2D electrolytes.

“We anticipate that as 2D electrolytes have similarities with biological or natural systems, they are capable of spontaneously self-assembling and cross-linking to form nanofibres that are promising for applications in filtration membranes, drug delivery and smart e-textiles.”



LABORATORY & SCIENTIFIC SUPPLIES



XD7500 UV-VIS | ALL ROUNDER | EASY TO USE
STATE OF THE ART SPECTROPHOTOMETER



Premium optical system with reference beam
Automatic test recognition with internal barcode reader
Automatic cuvette type detection



Contact us for more information

LABTEK PTY LTD

P. 1300 881 318

E. sales@labtek.com.au

labtek.com.au



Package for traceable humidity calibrations

The ability to perform traceable humidity calibrations of probes in-house is being brought within the reach of more users, with the help of a package offered by Michell Instruments.

The benefits of performing calibrations in-house include less process downtime as well as reduced costs since fewer probes will be sent to external calibration laboratories. However, the capital outlay required for traditional systems can be prohibitive for all but the largest companies. Michell's combination of the HygroCal 100 humidity validator with the Optidew 401 chilled mirror hygrometer is designed to place in-house calibrations, with all their benefits, in the reach of more companies.

The Optidew 401 chilled mirror hygrometer is traceable to national standards to provide a reference for humidity calibrations. It is accurate to $\pm 0.15^\circ\text{C}$ dewpoint and $\pm 0.15^\circ\text{C}$ temperature, and connects easily to the HygroCal 100. Both instruments are light and compact, allowing users to easily move the system to where it is needed most, or pack away if not required to save space.

The HygroCal100 is a lightweight, portable humidity verifier, which uses its internal polymer reference to provide automatic verifications of the accuracy of RH probes. However, the HygroCal100 interface enables users to assign a hygrometer with an analog output as a reference device. This allows the unit to be used to perform full calibrations of humidity probes, which are traceable to the reference used.

In order to better serve users with an extended range of humidity and temperature calibration products and services, Michell has partnered with fellow process sensing technologies company Rotronic to provide a more versatile and extensive humidity calibration range. The offering includes commercial calibration services in ISO17025 accredited laboratories, fully functional dewpoint calibration systems with climatic chambers as well as transportable humidity generators for field calibrations.

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au



FREE

to industry and business professionals



The magazine you are reading is just one of 11 published by Westwick-Farrow Media. To receive your free subscription (magazine and eNewsletter), visit the link below.



wfmedia
connecting industry



www.WFMedia.com.au/subscribe



All we need is space!

One of the biggest barriers to growth for Australia's biotech sector is the simple lack of suitable lab space. So why not rent a lab? Well first you need to find or build the exact lab for your needs, and good labs don't grow on trees.

The concept of fully-flexible and ready-to-go technical spaces that can be adapted to any scientific, clinical, or commercial use has been practically non-existent in Australia. Yes there are incubators, accelerators, and a number of various institutional and semi-government models in most large population centres in Australia. Such spaces resemble US-style incubators for start-ups and normally come with strings attached — seed funding in return for IP and/or shares, or other means of diluting ownership in return for a roof over the head and some bench space in a lab (often shared with other unrelated parties).

Now this works for some... but for many entities (particularly if established and mature), the sharing of IP and dilution of ownership is not an option, not necessary, and not an advantage to growth. For these the concept of having the perfect lab and cleanroom space on a purely commercial rental model is their only ask.

'All we need is space' is what we hear almost daily from this section of the market. They are looking for a facility where the entry costs are low, the overheads are fixed, the headaches of maintenance and building outgoings are taken care of, and most of all — the science belongs to them alone.

This is the 'Yild' model now operating in Sydney and soon to launch in other major centres in Australia. Yild Technical Spaces (Yild) was born in 2019 to bring fully serviced space within reach of pharma, diagnostics, environmental, food and beverage enterprises, to name just a few.

The format of the Yild facility is a highly collaborative, multi-tenant environment, combining modern labs and cleanroom space, with hot desks, meeting rooms, kitchen,

break-out areas, reception and goods in/out. The inaugural Yild facility in Sydney is a hub of thriving entities who have found the perfect space to innovate, collaborate and grow. As of today there are 6 companies who call the facility home.

Each enjoys the ideal combination of dedicated customised lab space, with the ability to collaborate with other Yild members outside the lab on a daily basis. Hani Nur, Director of HA Tech, a diagnostics and biotech company, has this to say:

"The Yild model was a really good find for us and has allowed our company to operate in a world-class space, without the expense and hassle of finding and fitting out our own lab. Within the first 12 months we outgrew our lab and moved to a larger lab within the same facility, which proves just how dynamic our needs, and how flexible Yild was to accommodate them."

When asked about other lab rental options, Hani adds:



Hani Nur, Director of HA Tech

"There is really nothing out there quite like Yild, which is simply dollars for serviced space. Joining an incubator type model had no advantage to us as we have the expertise, the funding, and the personnel. We just needed a place to be!"

So how does Yild customise each space and keep up with ever changing requirements of its clients? It's about our people.

Yild is an agile private company whose key personnel are experienced in delivering top end PC2 labs and ISO grade cleanrooms, on time and on budget. Customised solutions are available including:

- Fume cupboards
- Biosafety cabinets
- Lab gas storage and reticulation
- Freezer rooms
- Lab waste solutions
- DG storage

Since the success of the Yild facility in Sydney, expressions of interest are being invited from potential clients in Melbourne, Brisbane and Adelaide.

The Yild team is looking forward to bringing facilities to these major centres, based on the proven knowledge that clients simply want a great space for the magic to happen. This is a partnership which works: 'You do science, we do space'.

Contact facility manager Celia Pineda
0447 156 953



Yild Technical Spaces Pty Ltd
www.yild.com.au



Symposium: Science and the Public Good

August 12, online

The value of scientific knowledge has been amply illustrated as we seek to understand and control a highly infectious virus, but science is not only about pandemics: in Australia it also underpins our capacity to live relatively healthy, prosperous and secure lives. The Australian Academy of Science's annual symposium will therefore explore the value of science to everyone. At 'Science and the Public Good', speakers will highlight the critical importance of studying mathematics, chemistry, biology and physics, and how this fundamental knowledge is essential to scientific advances. The event will be live-streamed around the world from the iconic Shine Dome in Canberra, enabling participants to hear from distinguished scientists from across Australia as they talk about their own work and the importance of the broader disciplines.
<https://aas.eventsair.com/2021-science-at-the-shine-dome/symposium>

AMSA 2021 Conference

June 27–July 2, online
<https://amsa2021.amsa.asn.au/>

Pathology Update 2021

July 2–4, Sydney and online
<https://www.rcpa.edu.au/Events/Pathology-Update>

FOODCONF 2021

July 12–14, Melbourne
<https://www.foodconferencesaustralia.com/>

foodpro 2021

July 25–28, Sydney
<https://foodproexh.com/>

Network Gender & STEM Conference 2021

July 29–30, Sydney
<http://www.genderandstem2020.com.au/>

Collaborate Innovate 2021

August 9–11, Canberra
<https://collaborateinnovate.com.au>

HGSA 44th Annual Scientific Meeting

August 14–17, Adelaide and online
<https://aacb.eventsair.com/hgsa-44th-annual-scientific-meeting/>

National Science Week 2021

August 14–22, Australia wide
<https://www.scienceweek.net.au/>

Sydney Science Festival 2021

August 14–22, Sydney
<https://www.maas.museum/event/sydney-science-festival/>

AIMS National Scientific Meeting 2021

August 30–September 1, Melbourne and online
<https://aomevents.eventsair.com/aims-national-scientific-meeting-2021/>

ASCIA 2021 Conference

September 1–3, online
<https://www.ascia2021.com/>

Australasian Exploration Geoscience Conference

September 15–20, Brisbane
<https://2021.aegc.com.au/>

AACB 58th Annual Scientific Conference

September 28–30, Brisbane and online
<https://aacb.eventsair.com/aacb-58th-annual-scientific-conference/>

Materials Oceania 2021

October 11–14, Brisbane and online
<https://www.materialsconferenceaustralia.com/>

AusBiotech 2021

October 25–29, online
<https://www.ausbiotechnc.org/>

AIMS NSW North Coast Division Conference 2021

November 12–14, Armidale
<https://www.aims.org.au/events/event/nsw-north-coast-division-conference-2021>

Food Structure, Digestion & Health International Conference

November 16–19, online
<https://events.csiro.au/Events/2021/April/23/Food-Structure-Digestion-Health-International>

6th International Conference on Frontiers of Composite Materials

November 20–22, Melbourne
<http://www.icfcm.org/>

16th Congress of the FAOBMB

November 22–25, Christchurch and online
<https://www.faobmb2021.org/>

Tell the world about your event: email LLS@wfmedia.com.au

40
CELEBRATING
YEARS

wfmedia
connecting industry

Westwick-Farrow Media

A.B.N. 22 152 305 336
www.wfmedia.com.au

Head Office

Unit 7, 6-8 Byfield Street,
(Locked Bag 2226)
North Ryde BC NSW 1670,
AUSTRALIA
Ph: +61 2 9168 2500

Editor

Lauren Davis
LLS@wfmedia.com.au

Publishing Director/MD

Geoff Hird

Art Director/Production Manager

Julie Wright

Art/Production

Colleen Sam, Veronica King

Circulation

Dianna Alberry
circulation@wfmedia.com.au

Copy Control

Mitchie Mullins
copy@wfmedia.com.au

Advertising Sales

Sales Manager: Kerrie Robinson
 Ph: 0400 886 311
kr Robinson@wfmedia.com.au

Nikki Edwards

Ph: 0431 107 407
nedwards@wfmedia.com.au

Tim Thompson

Ph: 0421 623 958
tthompson@wfmedia.com.au

If you have any queries regarding our privacy policy please email privacy@wfmedia.com.au

Printed and bound by
Dynamite Printing

Print Post Approved PP100008671

ISSN No. 2203-773X

All material published in this magazine is published in good faith and every care is taken to accurately relay information provided to us. Readers are advised by the publishers to ensure that all necessary safety devices and precautions are installed and safe working procedures adopted before the use of any equipment found or purchased through the information we provide. Further, all performance criteria was provided by the representative company concerned and any dispute should be referred to them. Information indicating that products are made in Australia or New Zealand is supplied by the source company. Westwick-Farrow Pty Ltd does not quantify the amount of local content or the accuracy of the statement made by the source.



Flow Solution 3700 Flow Injection Analyser

- Accurate results compliant with ISO, ASTM, DIN, & USEPA methods
- Run FIA & SFA methods interchangeably on the same system
- Interchangeable chemistry cartridges
- Intuitive, easy-to-use software
- In Australia for over 30 years, here to stay!

Contact: Graeme Walker +61 (0)408 422 188
www.walkerscientific.com.au
Email: graeme@walkerscientific.com.au

Nucleofector™ Technology

Stretching Transfection Dimensions



Make it easier to transfect hard-to-transfect cell lines and primary cells.

Fast, consistent and reliable transfection results, Optimized Protocols for more than 750 cell types and excellent scientific support so you can focus on ground-breaking research.

Discover the modular 4D-Nucleofector® Platform and take advantage of maximum flexibility and performance.

The modular design of the Nucleofector® Platform with units for small, medium or large scale, adherent cells or cells in suspension, allows you to configure the 4D-Nucleofector® System to fit your specific research needs.

A great system for Gene Therapy.

Request a virtual demo to
Bioscience.Australia@Lonza.com

Lonza Australia Pty Ltd
Lonza Pharma - Bioscience Solutions
Tel: +61 3 9550 0883
Local Call: 1300 657 508
Email: bioscience.australia@lonza.com

www.lonza.com/4d-nucleofector