Prepare to be MIND-BLOWN at

ANFF-SA Microengineering School

Tuesday 20th to Friday 23rd Sept, 2022 www.anff-sa.com

Building MM, Room 1-05, Mawson Lakes Campus, UniSA Future Industries Institute

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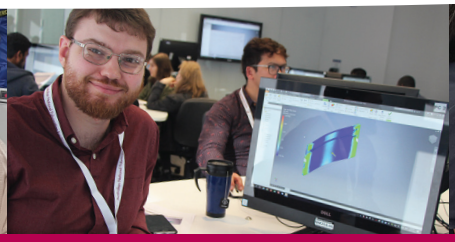

The South Australian Node of the Australian National Fabrication Facility

Providing micro and nano fabrication facilities for Australia's researchers

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NCRIS National Research Infrastructure for Australia An Australian Government Initiative

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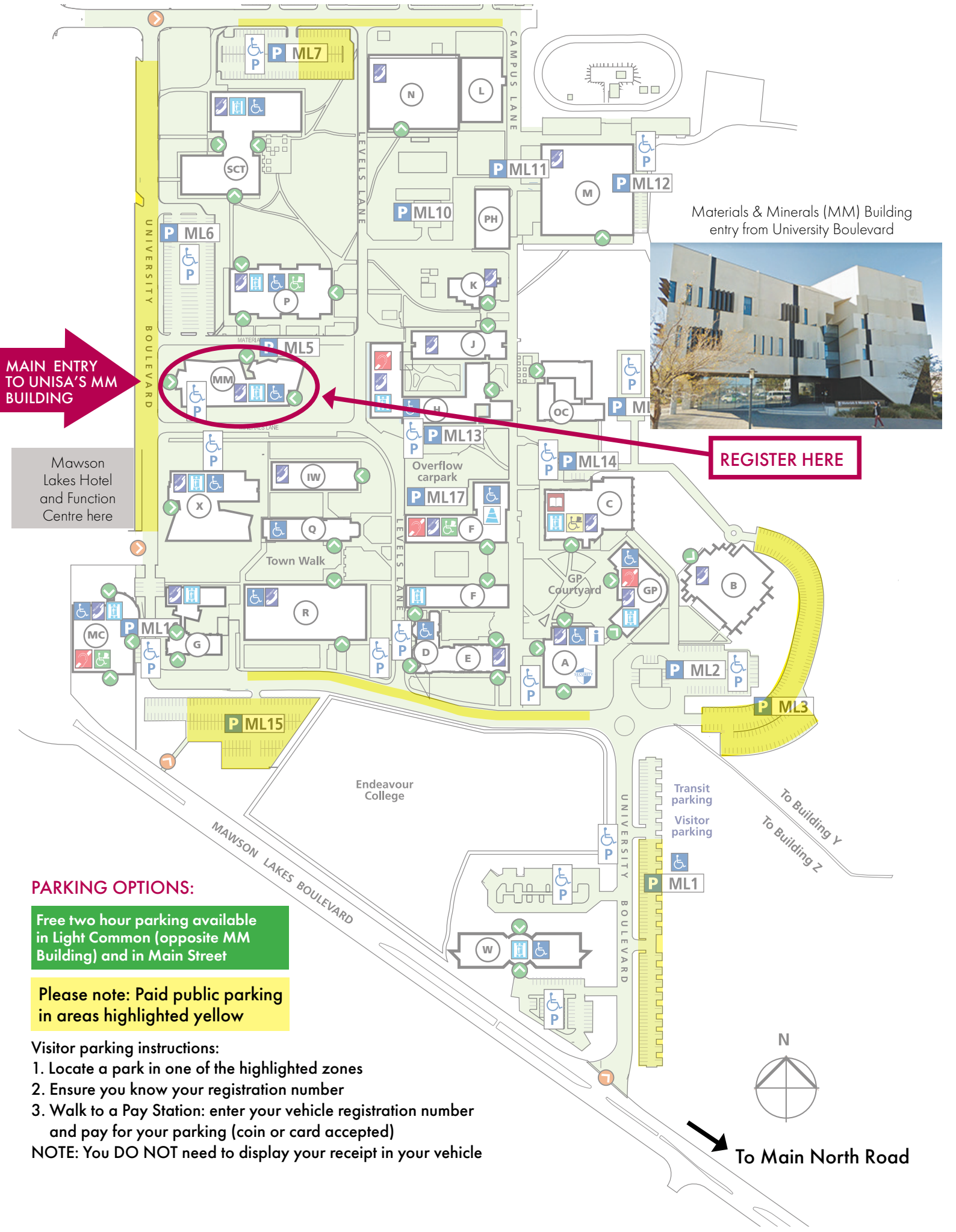
ANFF-SA

ANFF-SA Microengineering School

Location: UniSA Mawson Lakes campus, Mineral and Materials (MM)Building



Materials & Minerals (MM) Building entry from University Boulevard

PARKING OPTIONS:

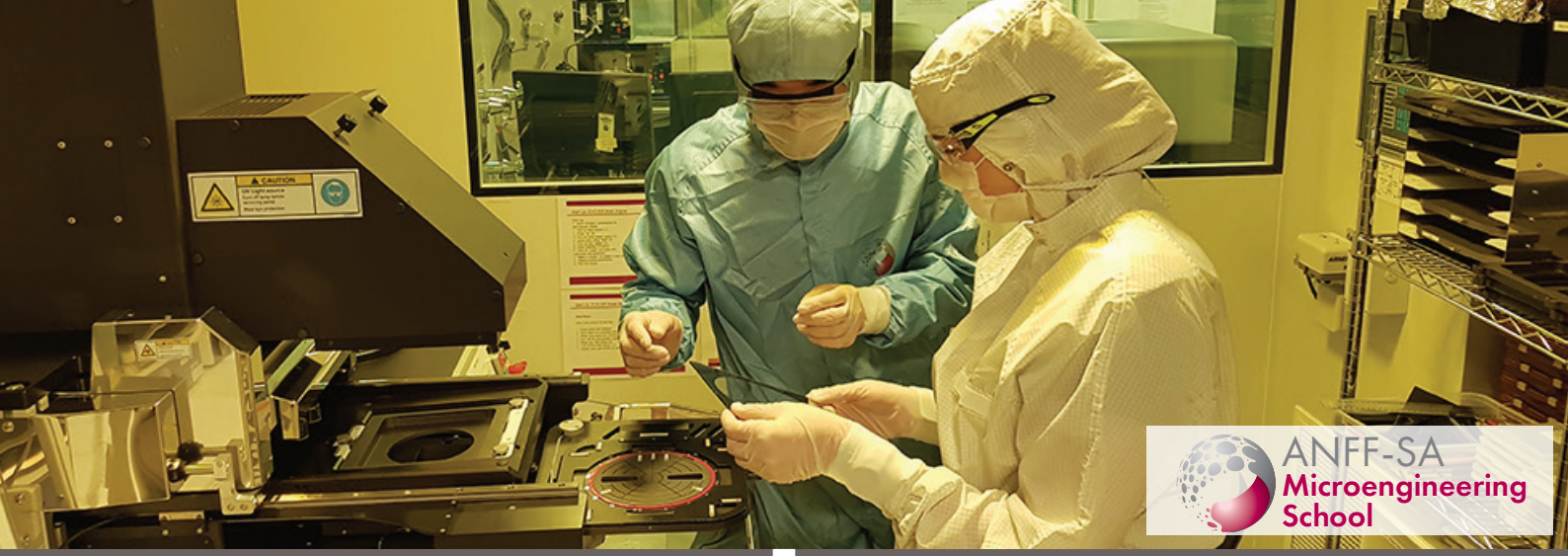
Free two hour parking available in Light Common (opposite MM Building) and in Main Street

Please note: Paid public parking in areas highlighted yellow

Visitor parking instructions:

1. Locate a park in one of the highlighted zones
2. Ensure you know your registration number
3. Walk to a Pay Station: enter your vehicle registration number and pay for your parking (coin or card accepted)

NOTE: You DO NOT need to display your receipt in your vehicle



ANFF-SA Microengineering School

Tuesday, September 20

TIME	SESSION
8.45am	**Registration** Foyer of Building MM
9.00am	**Welcome and opening remarks** A/Prof. Craig Priest, ANFF-SA Director, Future Industries Institute, UniSA
9.10am	**Opening address** Dr Jane Fitzpatrick, CEO, ANFF
9.20am	**Overview of ANFF-SA Microengineering School** A/Prof. Craig Priest, ANFF-SA Director, Future Industries Institute, UniSA
9.50am	**INSIGHT ONE: Microengineering for Space Technology** (online delivery) Dr. Srihari (Hari) Rajgopal, NASA Glenn SiC Technology
10.20am	MORNING TEA
10.40am	**LECTURE ONE: Thin film coatings** A/Prof. Colin Hall, Foundation Fellow, UniSA
11.20am	**LECTURE TWO: Photolithography** Dr Maryam Khaksar, Research Engineering, Operations Enablement Division, DSTG
12.00pm	LUNCH + GROUP PHOTO
12.50pm	**Industry tour: Tindo Solar**
1.50pm	**PRACTICAL SESSION ONE**
3.20pm	AFTERNOON TEA
3.40pm	**PRACTICAL SESSION TWO**
5.10pm	CLOSE OF DAY

Wednesday, September 21

TIME	SESSION
8.45am	**Registration** Foyer of Building MM
9.00am	**Opening remarks** A/Prof. Craig Priest, ANFF-SA Director, Future Industries Institute, UniSA
9.10am	**INSIGHT TWO: Lab on a chip: miniaturising the chemistry laboratory** Prof. Michael Breadmore, ARC Future Fellow, University of Tasmania
9.40am	**INSIGHT THREE: Applications of Two-Photon Polymerization (2PP) for microIVF** Allison Love, Chief Product Engineering Officer, Fertilis
10.10am	MORNING TEA
10.30am	**LECTURE THREE - Etching** Dr Donghoon Chang, ANFF-SA Microfabrication Technologist, UniSA
11.10am	**LECTURE FOUR: Laser milling** Dr Ben Johnston, ANFF OptoFAB Facility Manager, Macquarie University
11.50pm	LUNCH
12.10pm	**Industry tours: Codan and Rapier**
1.20pm	**PRACTICAL SESSION THREE**
2.50pm	AFTERNOON TEA
3.10pm	**PRACTICAL SESSION FOUR**
4.40pm	CLOSE OF DAY

- ANFF OptoFab dinner & tour - 6-8pm Wednesday Sept 21

SCHEDULE:

6.00pm Register
6.10pm Tours
7.00pm Networking (pizza /drinks)
8pm Close of event

You are invited to visit ANFF Optofab node to learn the latest in:

- Glass manufacturing • Glass extrusion • Fibre drawing
- 4 Advanced manufacturing (metal 3d printing & ultrasonic CNC machining).

Limited seats - 30 people maximum

Free with registration available at ANFF-SA Microengineering School

ANFF OPTOFAB

Thursday, September 22 - PUBLIC HOLIDAY*

***DUE TO THE RECENTLY ANNOUNCED PUBLIC HOLIDAY THESE INSIGHT TALKS AND LECTURES WILL NOW BE AVAILABLE VIA THE ONLINE LINKS BELOW SO YOU CAN LISTEN AT YOUR LEISURE.**

If you have any questions relating to these presentations, please direct them to belinda.turner@unisa.edu.au and you will be put in contact with the relevant presenter.

Thank you for your understanding in these circumstances.

INSIGHT FOUR: Speciality optical glasses and fibre: fabrication and applications

Prof. Heike Ebendorff-Heidepriem, Deputy Director of the Institute for Photonics & Advanced Sensing, University of Adelaide

INSIGHT FIVE: Advanced undersea sensor technology

Dr Scott Foster, Principal Scientist, DSTG

Link to recording of Prof Ebendorff-Heidepriem and Dr Scott Foster: https://youtu.be/qY_3BSe_p5U

LECTURE FIVE - Micromachining

Mark Cherrill, ANFF-SA Microfabrication Technologist, UniSA

LECTURE SIX: Micro injection moulding

Dr Jing-Hong (Mike) Pai, ANFF-SA Nanofabrication Technologist

Link to recording of Mark Cherrill and Dr Jing-Hong (Mike) Pai: https://youtu.be/wvjn2kH0U3k

Friday, September 23

TIME	SESSION
8.45am	**Registration** Foyer of Building MM
9.00am	**Opening remarks** A/Prof. Craig Priest, ANFF-SA Director, Future Industries Institute, UniSA
9.10am	**LECTURE SEVEN - Fundamentals of wafer bonding** (online delivery) Dr Thorsten Matthias, Regional Sales Director Asia-Pacific, EV Group
9.50am	**LECTURE EIGHT - Packaging** Dr Berrak Kurdzinski /Coco Kennedy, Research Engineering, Operations Enablement Division, DSTG
10.30am	MORNING TEA
10.50am	**INSIGHT SIX: Medical Device Partnering Program - case study for success** Stephen Blakeney, Medical Device Partnering Program, Flinders University
11.20am	**INSIGHT SEVEN: Lessons learned in starting up new technology-based companies** Dr Leanna Read, Chair and Managing Director, CRC for Cell Therapy Manufacturing; Chair, Carina Biotech Pty Ltd and TekCyte Pty Ltd; Former Chief Scientist for South Australia
11.50am	Certificate presentation with A/Prof. Craig Priest and Dr Leanna Read
12.20pm	LUNCH (+ tour of UniSA FII Industry 4.0 Testlab)
1pm	**UniSA FII tours: Dr Kamil Zuber and Prof. David Lancaster (20 mins each tour)**
1.40pm	**PRACTICAL SESSION SEVEN**
3.10pm	AFTERNOON TEA
3.30pm	**PRACTICAL SESSION EIGHT**
5pm	CLOSE OF DAY

Practical sessions

	DETAILS & LOCATION
Practical 1	**Photolithography (CLEAN ROOM)**
Presented by:	Dr Jing-Hong (Mike) Pai, ANFF-SA and UniSA; Mohamed Amen, UniSA
Location: Q Building Cleanroom	In this practical, you will follow the spin-coat, expose, and develop processes for micro-gear fabrication and heaters.
Practical 2	**Etching (CLEAN ROOM)**
Presented by:	Dr Donghoon Chang, ANFF-SA and UniSA; Edward Cheah, UniSA
Location: Q Building Cleanroom	In this practical you will become familiar with laboratory processes for etching of thin metal layers.
Practical 3	**Design**
Presented by:	Simon Doe and Mark Cherrill, ANFF-SA and UniSA
Location: MM2-04	This practical will cover lithographic mask fundamentals. You will also design parts using 2D and 3D CAD software.

	DETAILS & LOCATION
Practical 4	**PDMS devices**
Presented by:	Dr Mona Tarek Elsemary, Tekcycte and Alex Gheorghiu, UniSA;
Location: MM2-11	Hands-on experience casting PDMS on microchannel master structures. Chips will be bonded using plasma and you will test them in our microfluidics laboratories.
Practical 5	**Characterisation techniques**
Presented by:	Dr Jason Gascooke, ANFF-SA and Flinders University; Craig Noble, Evident/Olympus; Son Ngyuen, Leica Microsystems
Location: MM2-10	Learn how to use a scanning electronic microscope (SEM) to create images for examining a multitude of materials and for quality control/failure analysis. Observe and identify defects in a real device using a range of optical inspection techniques for characterising fabricated devices.
Practical 6	**Microelectrodes**
Presented by:	Igor Switala, DSTG and Sruthi Choppalli, UniSA
Location: Q2-11	Introduction to wafer dicing and bonding. You will also electrically test some heaters made by thin film deposition and lithography.

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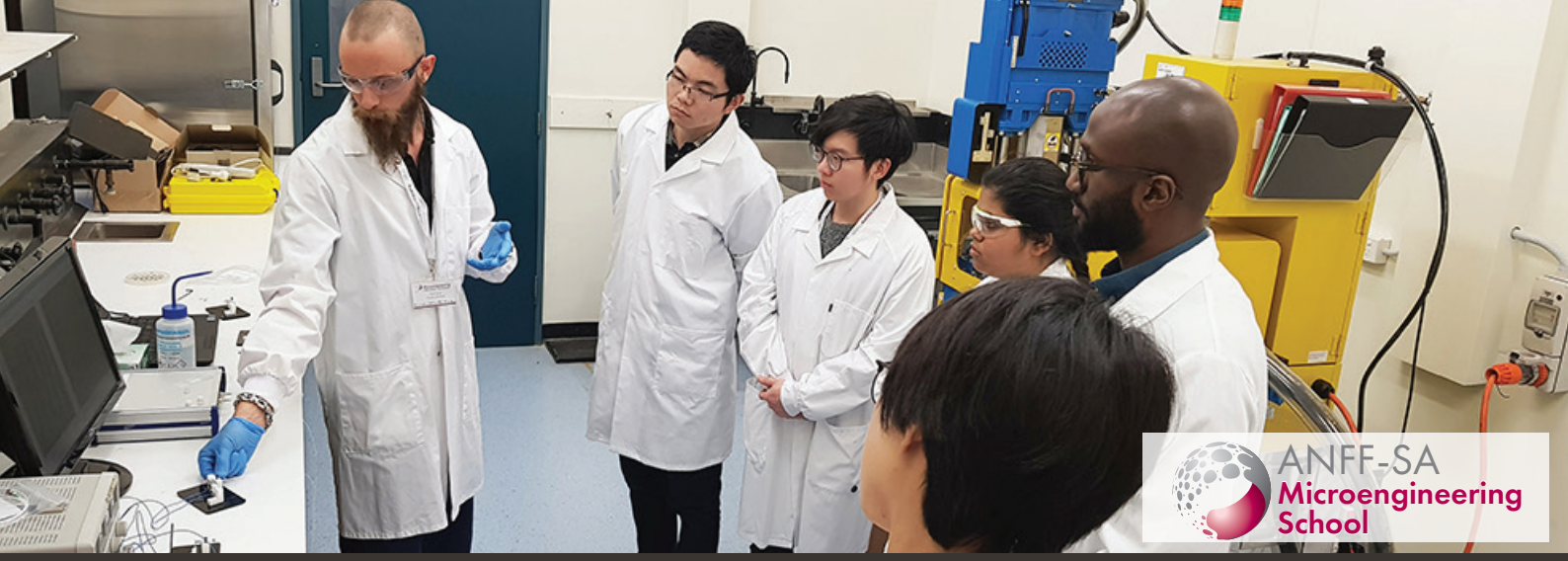

Participants will be allocated a practical session group at registration on Tuesday, Sept 20.

Practical session schedule

	PRACTICAL	LOCATION	PRACTICAL SESSION GROUP NUMBER					
			TUESDAY		WEDNESDAY		FRIDAY	
			1	2	3	4	5	6
90 min session	**Photolithography** Dr Jing-Hong Pai & Mohamed Amen	**Cleanroom Q2-30**	A	B	C	D	E	F
90 min session	**Etching** Dr Donghoon Chang & Edward Cheah	**Cleanroom Q2-30**	B	A	D	C	F	E
90 min session	**Design** Simon Doe & Mark Cherrill	**MM2-04**	E	F	A	B	C	D
90 min session	**SEM simulation & inspection** Dr Jason Gascooke, Craig Noble & Son Nguyen	**MM2-10**	F	E	B	A	D	C
90 min session	**PDMS devices** Dr Mona Elsemary (Tues/Wed) & Alex Gheorghiu	**MM2-11**	C	D	E	F	A	B
90 min session	**Microelectrodes** Igor Switala & Sruthi Choppalli	**Q2-11**	D	C	F	E	B	A

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ANFF-SA Microengineering Winter School industry tours

TOUR - TUESDAY SEPTEMBER 20 FROM 12.50 TO 1.50PM

Tour 1 — **Tindo Solar - 5/6-8 Second Avenue, Mawson Lakes**

Tindo designs and manufactures technologically advanced solar panels in Australia, for Australia and the world. Tindo Solar is a wholly Australian owned and operated company, founded in 2011, focused on increasing manufacturing output and creating Australian jobs in the advanced manufacturing sector.

Presented by: Robert Sporne, General Manager

TOURS - WEDNESDAY SEPTEMBER 21 FROM 12PM TO 1PM

Tour 1 — **Rapier - 9A Park Way, Mawson Lakes**

Rapier offer comprehensive Electronics Manufacturing Services (EMS) to cover all of your product needs. From Printed Circuit Board Assembly (PCBA) to Printed Circuit Board (PCB) supply and part procurement for prototyping and product development, volume production for consumer use items right through to critical use, space electronics, no job is too big or too small.

Presented by: Daniel Mason, Operations Manager and Business Development

Tour 2 — **CODAN - 2 Second Ave, Mawson Lakes**

Codan provides technology that has your back in the harshest environments on earth. Whether it's for communications, safety, security or productivity, Codan are relied upon by humanitarian organisations, mining companies, security and military groups, governments and adventurers in every corner of the globe.

Presented by: Dave Pilcher, Group Operations Manager and Lilian Choo, Supply Chain Manager

TOUR - FRIDAY SEPTEMBER 23 FROM 1PM TO 2PM

Tour — **UniSA Future Industries Institute tour**

UniSA's Future Industries Institute focuses on building knowledge and capacity in core future industries across four key strands: minerals and resources engineering, energy and advanced manufacturing, environmental science and engineering, biomaterials engineering and nanomedicine.

Presented by: Prof. David Lancaster and Dr Kamil Zuber

ANFF-SA Microengineering School

Speaker list for ANFF-SA Microengineering School 2022

A/Prof. Craig Priest - Director, ANFF-SA and Research Leader UniSA Future Industries Institute

Professorial Lead at Future Industries Institute (UniSA) and Director of ANFF-SA – a $20M advanced manufacturing investment at UniSA and Flinders University. Craig oversees teams of research and technical personnel working on interfacial, physical, and analytical science in micro/nanofluidic devices for new sensing and manufacturing applications. He has been awarded > $20M of research and infrastructure funding from ARC, NCRIS, AAS, SA Government in collaboration with > 20 industry collaborators in lab-on-a-chip technologies, new sensors, process intensification, and advanced manufacturing.

Dr Jane Fitzpatrick - Chief Executive Officer, ANFF

Jane led ANFF's Queensland node for a number of years, joining the HQ team as its Chief Operating Officer in 2019, before becoming CEO in 2021.

Her responsibilities include ensuring the network performs as a cohesive and collaborative community, and maximising ANFF's ability to support projects from academia and industry.

Dr. Srihari (Hari) Rajgopal, NASA Glenn SiC Technology

Developing extreme environment silicon carbide (SiC) electronics for aerospace systems, Dr Rajgopal joined NASA in 2019 after completing his PhD in Electrical Engineering.

He has participated in sensor/actuator development and sensor-integration projects including a piezoelectric valve and drag force flow sensor for fuel modulation in jet engines, NEMS mechanical switches to lower standby power reduction for energy efficient integrated circuits, a surface micromachined SiC capacitive accelerometer for combustion applications, and personnel navigation in GPS-denied environments.

A/Prof. Colin Hall, Foundation Fellow, UniSA

An Industry Associate Professor at the Future Industries Institute (University of South Australia), Colin leads a research team focused on developing robust coating systems for mining, automotive, decorative and energy applications.

This work spans fundamental research, developing and operating deposition systems through to tech transfer and commercialisation of the groups' research. He has been recognized for this work with the Prime Ministers Prize for New Innovators in 2016. Colin has worked in private industry for nine years and academia for 18 years.

Dr Maryam Khaksar, Research Engineering, Operations Enablement Division, DSTG

Maryam commenced her role as Materials Researcher at DSTG in September 2021. Prior to this, she worked at ANFF-SA/UniSA as nanofabrication technologist for more than five years.

She specialises in materials engineering, coatings, micro/nano fabrication and product development as well as advanced characterisation techniques such as nano/micro x-ray computed tomography and synchrotron spectroscopy techniques. Maryam received her PhD from University of South Australia in 2016.

Prof. Michael Breadmore, ARC Future Fellow,University of Tasmania

Director of the Australian Centre for Research on Separation Science, Michael was previously an ARC Future Fellow, QRC QEII Fellow and ARC APD.

He has a national and international reputation for the development of new and novel portable analytical systems with more than 180 peer-reviewed publications. Michael's research has been published in leading journals and he works with companies to perform fundamental and translational research, with the most recent product based on his research, GreyScan, released for global sales in 2018.

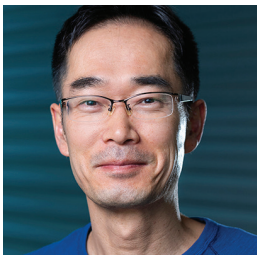
ANFF-SA Microengineering School

Speaker list for ANFF-SA Microengineering School 2022

Allison Love, Chief Product Engineering Officer, Fertilis

Allison Love is Chief Product Engineering Officer at Fertilis, where she leads on all aspects of product development, from manufacturing establishment to market release and production.

Fertilis is improving IVF by precisely controlling the environment of the embryo using low flow microfluidics and micro medical devices made possible with high-resolution additive manufacturing techniques. Allison joined Fertilis in 2021, bringing over 20 years of experience in product engineering and development, specialising in in-vitro diagnostics (IVD) and delivering medical devices to market.



Dr Donghoon Chang, ANFF-SA Senior Process Engineer, UniSA

Donghoon commenced his role as a microfabrication engineer at ANFF-SA in 2014. He completed his PhD at the University of Adelaide, which focussed on the development of analytical and numerical tools for predicting fatigue lifetime of structural components having mutually interacting cracks.

Prior to his PhD, Donghoon worked at Samsung Electronics as a senior process development engineer in the field of microelectromechanical systems (MEMS) and microfabricating optoelectronic devices, including vertical cavity laser diodes, PIN photodiodes, and micromachining silicon optical benches.

Dr Ben Johnston, ANFF OptoFAB Facility Manager, Macquarie University

Ben gained a Bachelors of Technology in Optoelectronics in 2004 and a PhD in Physics from Macquarie University in 2008.

Since 2002, Ben has assisted with the running of semi-commercial laser micromachining services, offered by Macquarie University. These facilities and activities form part the Australian National Fabrication Facility, and Ben's role is to provide fabrication solutions for researchers and industry using applied laser technologies.

Prof. Heike Ebendorff-Heidepriem, Deputy Director, Institute for Photonics & Advanced Sensing, University of Adelaide

Heike received her PhD in chemistry from the University of Jena, Germany and held two prestigious fellowships. In 2001 she received the Weyl International Glass Science Award and joined the Optoelectronics Research Centre at the University of Southampton, UK, before moving to Australia in 2005.

Heike leads the Fibres and Photonics Materials Research group at the University of Adelaide and is Deputy Director of the Institute for Photonics and Advanced Sensing. Her research focuses on the development of novel optical glasses, fibres, surface functionalisation and sensing approaches.

Dr Scott Foster, Next Generation Technology Fund (NGTF) Theme Lead, Advanced Sensors and Quantum Technologies, and Acting Lead for the Quantum Assured Position Navigation and Timing STaR Shot, with the Defence Science and Technology Group

After obtaining a Ph.D. in mathematical physics from the University of Adelaide in 1996, he worked in the opto-electronics industry for 3 years before joining DST as a Research Scientist in 1999. From 2003-2017 he led research into precision photonic sensor technologies for undersea surveillance and, in partnership with defence industry, has developed advanced fibre optic sonar systems. He currently leads national multi-institute initiatives on precision quantum sensing technologies and next generation piezo-electric materials.

Mark Cherrill, ANFF-SA Microfabrication Technologist, UniSA

Mark joined ANFF-SA after working as a mechanical designer for engineering companies in Adelaide on projects including oil and gas, water purification, rail and naval structures.

Prior to immigrating to Australia, Mark worked as a CNC Machinist/Programmer for the Honda Racing Team and Brawn GP where he completed a BSc in Engineering Design. He also worked in the Mercedes AMG Petronas Team in research and development. Mark's main focus is on the design and manufacture of microfluidic devices and components using the Kira CNC micromilling machine.

ANFF-SA Microengineering School

Speaker list for ANFF-SA Microengineering School 2022

Dr Jing-Hong (Mike) Pai, ANFF-SA Senior Process Engineer, UniSA

Mike has a research background in microfluidic design and micro / nano fabrication and extensive experience in manufacturing and product development. Focusing on the development of the multiplex biosensing method, Mike received his PhD in Engineering in 2014, from University of South Australia.

He joined ANFF-SA in 2015 as a Nanofabrication Technologist and is experienced in various micro/nano fabrication methods.

Dr Thorsten Matthias, Regional Sales Director Asia-Pacific, EV Group

Prior to his role as Regional Sales Director Asia Pacific, Dr Matthias was director of business development, specifically focused on 3D integration, MEMS, LEDs and a number of emerging markets.

He began his career with EVG in 2002 as the product manager for the SmartView wafer bonding alignment system and then became director of technology of EV Group North America in Tempe, Arizona.

Dr Matthias received his doctorate degree from Vienna University of Technology with a thesis in solid-state physics in 2002.

Dr Berrak Kurdzinski, Microfabrication Specialist, Research Engineering, Operations Enablement Division, DSTG

Berrak commenced her role at DST Group in 2019 as a Microfabrication Specialist and her professional portfolio includes 10+ years of combined research and industry experience within micro/nano environments. Berrak completed her Master of Engineering and PhD degrees at RMIT University.

Prior to DSTG, Berrak worked as a Project Engineer at MiniFAB, providing custom development and manufacture of disposable polymer microfluidic based medical diagnostic and life-science research devices.

Coco Kennedy, Microfabrication Specialist, Research Engineering, Operations Enablement Division, DSTG

Coco completed her BSc (Hons) in Materials Science at the University of New South Wales in 2020 and joined the Micro and Nano Engineering team at Defence Science and Technology Group in 2021.

As microfabrication specialist, Coco's experience includes photolithography and micropackaging techniques such as wirebonding, decapsulation and wafer dicing.

Stephen Blakeney, Innovations Manager, Medical Device Partnering Program, Flinders University

Stephen joined the Medical Device Partnering Program in 2019 after roles within the Department for Trade and Investment at the Government of South Australia and medical device cluster organisation MedTEC South Australia.

He led a South Australian Health and Life Sciences trade mission to China in 2018. Stephen started his career as a mechanical design engineer working for medical device companies in Australia and the UK.

Dr Leanna Read, Chair and Managing Director, CRC for Cell Therapy Manufacturing; Chair, Carina Biotech Pty Ltd and TekCyte Pty Ltd

Leanna brings extensive research, executive, board and investment experience, particularly in biotechnology and she is the former Chief Scientist for South Australia.

Leanna is Chair of Carina Biotech Pty Ltd and TekCyte Pty Ltd and her government board memberships include the federal Biomedical Translation Fund Committee.

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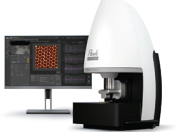

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