



Prepare to be MIND-BLOWN...

ANFF-SA Microengineering Winter School **10** YEAR ANNIVERSARY

Tuesday 4th to Friday 7th July, 2023

LOCATION:

Building MM 1-05, UniSA FII,
Mawson Lakes Campus

COST: FREE

REGISTRATION:

Attend [onsite](#) or join us [online](#)

More info: www.anff-sa.com



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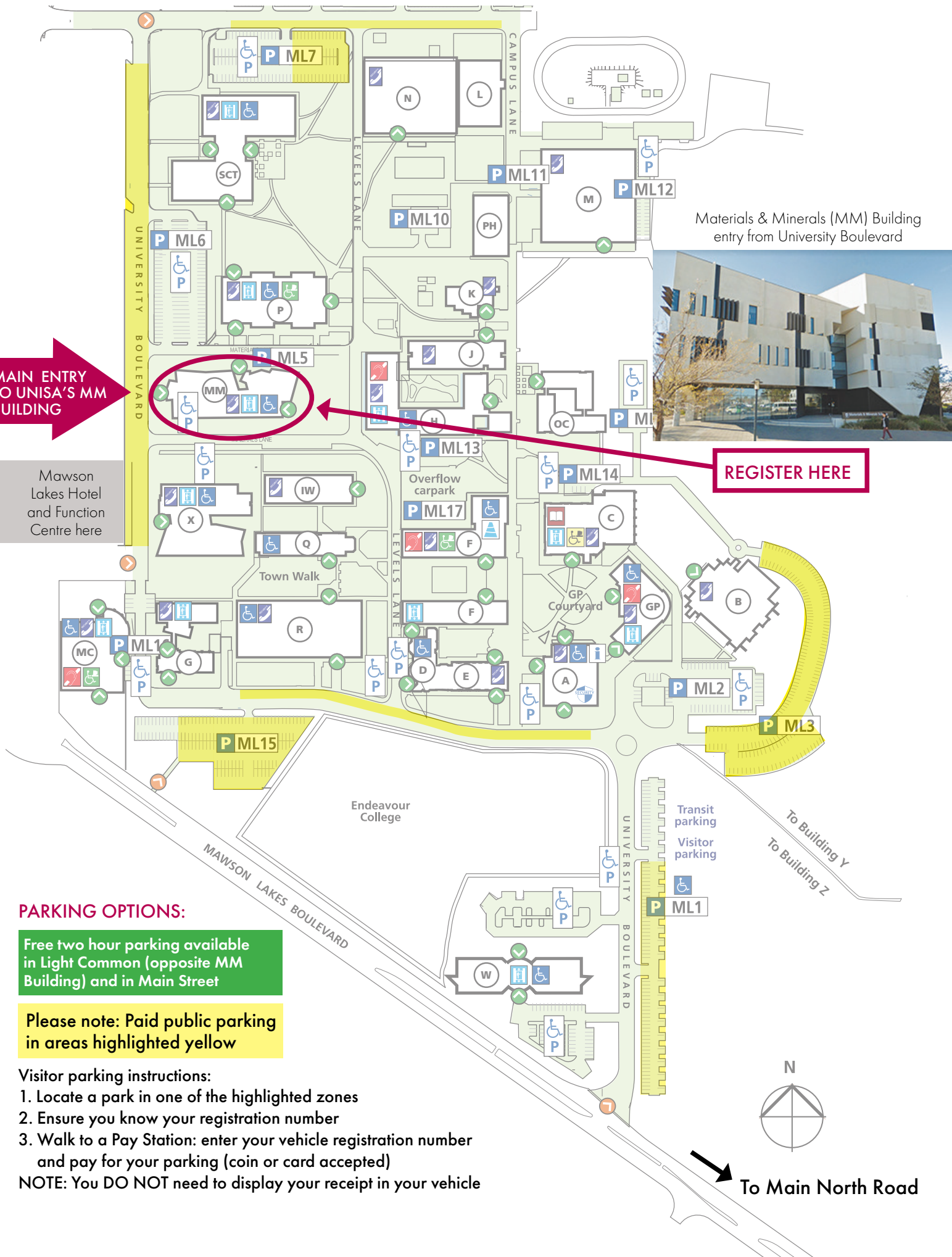


The South Australian Node of the Australian National Fabrication Facility

Providing micro and nano fabrication facilities for Australia's researchers



ANFF-SA



MAIN ENTRY TO UNISA'S MM BUILDING

Mawson Lakes Hotel and Function Centre here

REGISTER HERE

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



To Main North Road

To Building Y
To Building Z

Transit parking
Visitor parking

Endeavour College

MAWSON LAKES BOULEVARD

UNIVERSITY BOULEVARD

CAMPUS LANE

EVELS LANE

LEVELS LANE

UNIVERSITY BOULEVARD

Materials & Minerals (MM) Building entry from University Boulevard





Tuesday, July 4

TIME	SESSION
8.45am	Registration Foyer of Building MM
9am	Welcome Prof Craig Priest, Director, ANFF-SA
9.10am	Opening remarks Dr Jane Fitzpatrick, CEO, ANFF
9.15am	Sponsor video - NanoVacuum
9.20am	INSIGHT ONE: Lab on a chip: miniaturising the chemistry laboratory Prof Michael Breadmore, ARC Future Fellow, University of Tasmania
9.50am	INSIGHT TWO: Advanced undersea sensor technology Dr Scott Foster, STaRshot Lead, Quantum Assured Position, Navigation and Timing, DSTG
10.20am	MORNING TEA
10.40am	LECTURE ONE: Thin film coatings Dr Kamil Zuber, Research Fellow, UniSA
11.20am	LECTURE TWO: Photolithography Dr Sophia Su, ANFF-SA Microfabrication Technologist
12pm	LUNCH + GROUP PHOTO
12.50pm	Industry tour: Rapier
1.50pm	PRACTICAL SESSION ONE
3.20pm	AFTERNOON TEA
3.40pm	PRACTICAL SESSION TWO
5.10pm	CLOSE OF DAY

Wednesday, July 5

TIME	SESSION
8.45am	Registration Foyer of Building MM
9am	Opening remarks Prof Craig Priest, Director, ANFF-SA
9.05am	Sponsor video - Evident Scientific
9.10am	INSIGHT THREE: Speciality optical glasses and fibre: fabrication and applications Prof Heike Ebendorff-Heidepriem, Deputy Director of IPAS, University of Adelaide
9.40am	INSIGHT FOUR: Microengineering for Space Technology (Online delivery) Dr Srihari (Hari) Rajgopal, NASA Glenn SiC Technology
10.10am	MORNING TEA
10.30am	LECTURE THREE - Etching Dr Donghoon Chang, ANFF-SA Microfabrication Technologist, UniSA
11.10am	LECTURE FOUR: Laser milling (Online delivery) Dr Ben Johnston, ANFF Optofab Facility Manager, Macquarie University
11.50pm	LUNCH
12.40pm	Industry tour: Tindo Solar
1.40pm	PRACTICAL SESSION THREE
3.10pm	AFTERNOON TEA
3.30pm	PRACTICAL SESSION FOUR
5pm	CLOSE OF DAY

- ANFF OptoFab dinner & tour 6-8pm Wednesday July 5 -



SCHEDULE:

- 5.30pm Bus from UniSA MM Building to OptoFab
- 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 on bus - 21 people

Free with registration available at ANFF-SA Microengineering School





Thursday, July 6

Friday, July 7

TIME	SESSION
8.45am	Registration Foyer of Building MM
9am	Opening remarks Prof Craig Priest, Director, ANFF-SA
9.05am	Sponsor video - Leica Microsystems
9.10am	INSIGHT FIVE: Medical Device Partnering Program - case study for success Prof Karen Reynolds, Director Medical Device Partnering Program, Flinders University
9.40am	INSIGHT SIX: Rapid Quantum Materials and Device Prototyping at University of Adelaide Dr Petar Atanackovic, Silanna
10.10am	MORNING TEA
10.30am	LECTURE FIVE - Micromachining Mark Cherrill, ANFF-SA Microfabrication Technologist, UniSA
11.10am	LECTURE SIX - Micro injection moulding Dr Jing-Hong (Mike) Pai and Billy Michalatos, ANFF-SA
11.50am	LUNCH
12.40pm	UniSA FII tours: Dr Dale Otten and Dr Kamil Zuber and (30 mins each tour & swap)
1.40pm	PRACTICAL SESSION FIVE
3.10pm	AFTERNOON TEA
3.30pm	PRACTICAL SESSION SIX
5pm	CLOSE OF DAY

TIME	SESSION
8.45am	Registration Foyer of Building MM
9am	Opening remarks Prof Craig Priest, Director, ANFF-SA
9.05am	Sponsor video - EV Group
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 Coco Kennedy, Research Engineering, Research Technology and Operations Division, DSTG
10.30am	MORNING TEA
10.50am	INSIGHT SEVEN: Design thinking A/Prof Leah Heiss, The Eva and Marc Besen International Research Chair in Design, Monash University
11.20am	INSIGHT EIGHT: 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 Prof Craig Priest and Dr Leanna Read
12.30pm	LUNCH
1.30pm	PRACTICAL SESSION SEVEN
3pm	AFTERNOON TEA
3.20pm	PRACTICAL SESSION EIGHT
4.50pm	CLOSE OF DAY

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Practical sessions

DETAILS & LOCATION

Practical 1 Photolithography
 Presented by: Dr Jing-Hong (Mike) Pai, ANFF-SA and Mohammed Amen, UniSA
 Location: In this practical, you will follow the spin-coat, expose, and develop processes for micro-gear fabrication and heaters.
 Q Building Cleanroom

Practical 2 Etching
 Presented by: Dr Donghoon Chang, ANFF-SA and Sruthi Choppalli, UniSA
 Location: In this practical you will become familiar with laboratory processes for etching of thin metal layers.
 Q Building Cleanroom

Practical 3 CAD modelling and FEA analysis
 Presented by: Mark Cherrill and Izak Lorton, ANFF-SA
 Location: This practical will cover lithographic mask fundamentals. You will also design parts using 3D CAD software.
 MM2-04

Practical 4 PDMS devices
 Presented by: Dr Mona Tarek Elsemary, Tekcyte, Dr Sophia Su, ANFF-SA and Alex Gheorghiu, UniSA
 Location: Hands-on experience casting PDMS on micro-channel master structures. Chips will be bonded using plasma and you will test them in our micro-fluidics laboratories.
 MM2-11



DETAILS & LOCATION

Practical 5 Electrical integration
 Presented by: Dr Said Al-Sarawi, University of Adelaide
 Location: Build an electronic circuit that allows us to interface to a pressure sensor. Observe the pros and cons of the different interface circuits in simplifying the electronics or maximising the dynamic range of these sensors.
 MM1-04

Practical 6 3D Printing
 Presented by: Daniel Williams, ANFF-SA and Michael Bowditch, UniSA
 Location: Introduction to 3D printing from an engineering perspective. You will learn about development and production methods, the various techniques and engineering materials available to achieve the desired properties suited to your application.
 MM Building Industry 4.0 Testlab

Practical 7 Characterisation techniques
 Presented by: Dr Jason Gascooke, ANFF-SA; Craig Noble, Evident/Olympus; Son Ngyuen, Leica Microsystems
 Location: 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.
 P1-10

Practical 8 Microelectrodes
 Presented by: Igor Switala and Dr Maryam Khaksar, DSTG
 Location: Introduction to wafer dicing and bonding. You will also electrically test some heaters made by thin film deposition and lithography.
 Q2-11

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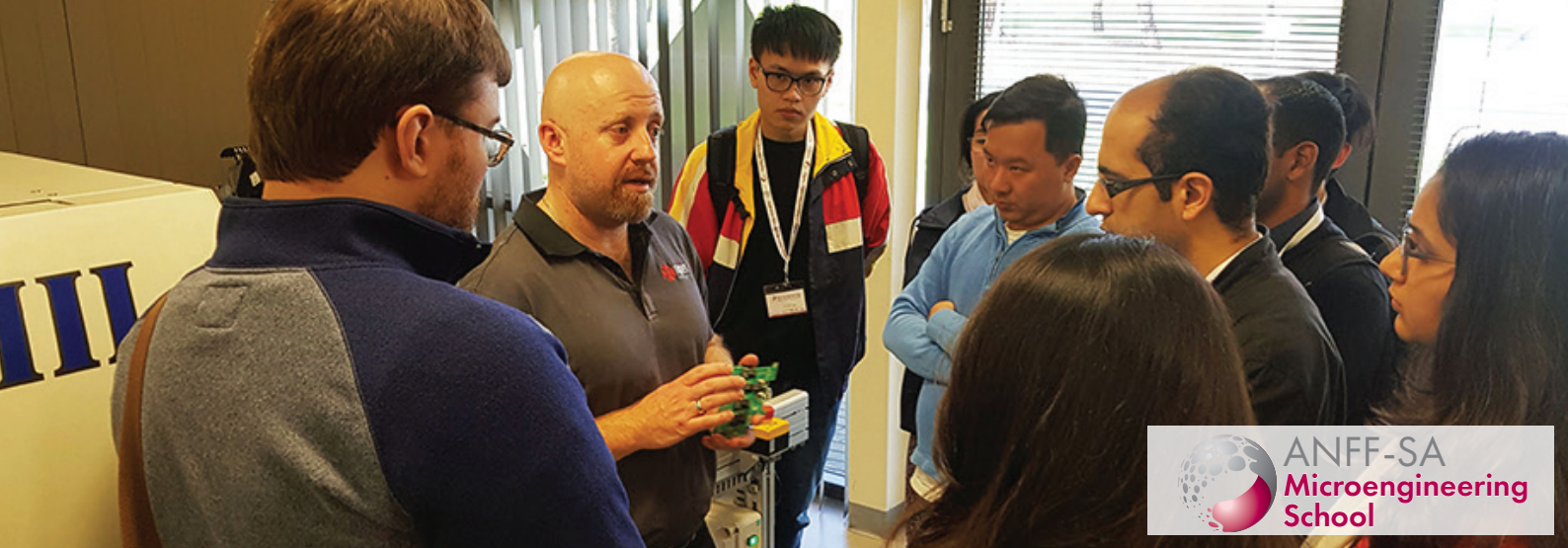


Participants will be allocated a practical session group at registration on Tuesday, July 4.
Practical session schedule

PRACTICAL & LOCATION	PRACTICAL SESSION GROUP NUMBER							
	TUESDAY		WEDNESDAY		THURSDAY		FRIDAY	
	1	2	3	4	5	6	7	8
Photolithography Location: Q2-30	H	G	F	E	D	C	B	A
Etching Location: Q2-30	G	H	E	F	C	D	A	B
CAD modelling and FEA analysis Location: MM2-04	F	E	H	G	B	A	D	C
Electrical integration Location: P1-10	E	F	G	H	A	B	C	D
PDMS devices Location: MM2-11	D	C	B	A	H	G	F	E
Microelectrodes Location: Q2-19	C	D	A	B	G	H	E	F
3D Printing Location: MM Industry 4.0 Testlab	B	A	D	C	F	E	H	G
Characterisation techniques Location: P1-10	A	B	C	D	E	F	G	H

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ANFF-SA Microengineering Winter School industry tours

TOUR - TUESDAY JULY 4 FROM 12.50 TO 1.40PM

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 - WEDNESDAY JULY 5 FROM 12.40PM TO 1.30PM

Tour 2 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

TOUR - THURSDAY JULY 6 FROM 12.40PM TO 1.40PM

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: Dr Kamil Zuber and Dr Dale Otten, UniSA

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Speaker list for ANFF-SA Microengineering School 2023



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 of the Australian National Fabrication Facility Ltd (ANFF)

Dr Fitzpatrick supports and fosters world-class research in Australia and the development of the industries, such as Defence, MedTech, Energy and Space. ANFF provides world class tools and expertise in the area of micro and nanofabrication on an open access framework to all of Australia for the research, development and commercialisation of technology.

Jane previously held positions within academia, the MedTech start-up space and industry focused research entities, as well as Board positions for Women in Technology. She holds a PhD in Applied Immunology and a degree in Biotechnology, and added technical expertise in many areas, including micro and nanofabrication.



Prof Michael Breadmore, 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 200 peer-reviewed publications, and has supported the release of 5 products at-market – the most recent being Eco Detection's Ion-Q, released for global sales in 2022.



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.



Dr Kamil Zuber, Research Fellow, UniSA

A Chartered member of Engineers Australia, Kamil holds PhD in Materials Science and MSc in Technical Physics. His work is posed around translating fundamental science into practical outcomes. He has worked on several industry-related projects such as electrochromic and plastic mirror projects, in close collaboration with SMR Technologies (Lonsdale, SA) with MARii on heat reflective coatings for automotive and with DSTG on adaptive camouflage and freeform optics for small satellites.

Kamil has contributed to successful projects including the development of the first automotive plastic mirror, now used on two million vehicles (Ford F250), decorative automotive trims now used on luxury vehicles and he has a strong academic output, including six patents and 37 journal publications.



Dr Sophia Su, ANFF-SA Microfabrication Technologist

Sophia has a research background in the field of microelectromechanical systems (MEMS) and previously worked at the Taiwan Semiconductor Research Institute (TSRI) for three years. During her time at TSRI, she was responsible for the development and fabrication of pressure sensors and gas sensors.

Sophia joined ANFF in 2021 as a Nanofabrication Technologist and focuses on micro/nanofabrication.

Speaker list for ANFF-SA Microengineering School 2023



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 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.



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 Karen Reynolds, Director of the Medical Device Research Institute and Medical Device Partnering Program, Dean (Research) of the College of Science and Engineering, Flinders University

One of Australia's leading researchers in biomedical engineering, Karen is passionate about bridging the divide between research and industry. In 2008, she founded the Medical Device Partnering Program (MDPP) to facilitate early-stage innovation and collaborations.

Karen holds a number of external roles including Member, Australian Medical Research Advisory Board and Director, Academy of Technological Sciences & Engineering Board. Her contributions have been recognised through awards including South Australian Scientist of the Year 2012 and Australian Professional Engineer of the Year in 2010.



Dr Petar Atanackovic, Silanna

Petar Atanackovic, Ph.D, is a scientist with over 25 years experience in advanced semiconductor materials discovery and Silicon micro/nano electronics manufacturing.

He has over 65 granted patents worldwide in the area of semiconductors ranging from new-to-the-world semiconductor materials, quantum engineered structures and devices.

He is the founder of Silanna's Oxide Technologies and Oxide Discovery Laboratory strategically developing Ultra-Wide Bandgap semiconducting materials and devices.

Speaker list for ANFF-SA Microengineering School 2023



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.



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.



Billy Michalatos, ANFF-SA Senior Process Engineer, UniSA

Graduating from UniSA in 2001 with a degree in advanced manufacturing and mechanical engineering, Billy undertook a 15 year adventure in the automotive industry which included returning part time to UniSA to complete his MBA. Billy returned to UniSA full time in 2018, and has adapted his skills from large scale, high volume manufacturing to micro scale prototyping. Billy joined ANFF in 2021 with a focus on assisting with expanding the micro injection moulding capability. With a newly found appreciation for micro scale fabrication, Billy is leading the nodes' micro scale 3D printing capability and expanding the fabrication potential of microfluidic devices with hot embossing and laser welding.



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.



Coco Kennedy, Microfabrication Specialist, Research Engineering, Research Technology and Operations 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.



A/Prof Leah Heiss, The Eva and Mark Besen International Research Chair in Design, Monash University

TBA



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.