



**3RD
DIRECT WRITE
LITHOGRAPHY
WORKSHOP**



Wednesday 19th February 2025 hosted by  **RMIT**
UNIVERSITY

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Wednesday 19th February 2025 hosted by  **RMIT**
UNIVERSITY

**This event will
be
photographed
and video
recorded.**

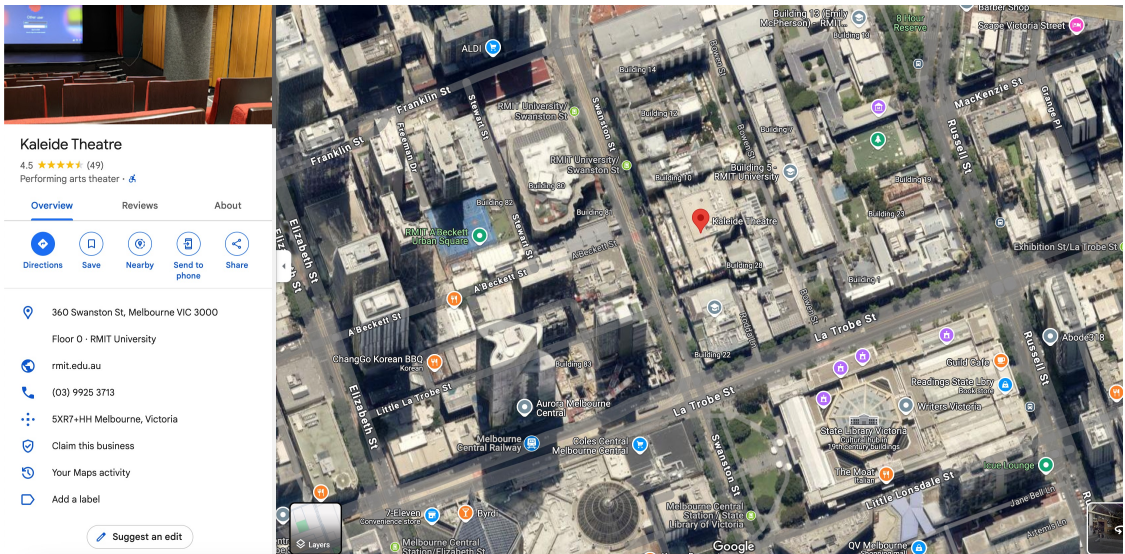
VENUE

Kaleide Theatre:
Building 8

[Google Maps Link](#)



3RD
DIRECT WRITE
LITHOGRAPHY
WORKSHOP



ACKNOWLEDGEMENT OF COUNTRY

RMIT University acknowledges the Wurundjeri people of the Kulin Nations as the traditional owners of the land on which the University stands. RMIT University respectfully recognises Elders both past and present.



Artwork by Wurundjeri artist Mandy Nicholson



Vision and Mission Statement

Pioneering Micro- and Nanofabrication Excellence in Australia

In the realm of cutting-edge micro- and nanofabrication, the Direct Write Lithography (DWL) Workshop emerges as a beacon of innovation, aiming to shape the future of technology through collaboration, education, and networking.

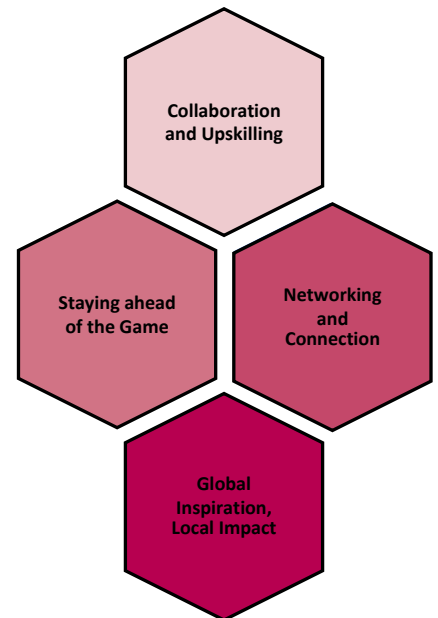
Our vision is to establish a dynamic platform in Australia that mirrors the success of renowned events like *Electron, Ion and Photon Beam technology and Nanofabrication 3Beams or EIPBN* in the US and the *International Micro and Nano Engineering Conference MNE* in Europe, fostering a culture of excellence in micro- and nanofabrication.

Mission Statement:

At the core of the DWL Workshop lies the commitment to promote collaboration among engineers, researchers, technicians, tool vendors, and service experts. We aspire to increase fabrication knowledge, enabling participants to exceed by embracing cutting-edge micro and nanofabrication techniques. Our mission is to provide a space for individuals to hear from leading engineers and scientific researchers, learn about the newest tool technology from our vendors, and connect with like-minded professionals.

Collaboration and Upskilling:

The DWL Workshop is not just an event; it's a collaborative ecosystem where minds converge to share experiences and ideas. Through meticulously curated sessions, participants will have the opportunity to augment their fabrication knowledge, gaining insights into the latest advancements in direct write lithography.





Staying Ahead of the Game:

In a rapidly evolving technological landscape, keeping up to date is imperative. The DWL Workshop acts as a conduit for knowledge transfer, bringing together pioneers in the field to share their expertise. By providing a platform for the exchange of ideas and experiences, attendees will gain a competitive edge, staying abreast of the latest developments in micro and nanofabrication.

Networking and Connection:

Connecting with fellow engineers, technicians, tool vendors, and service experts is a cornerstone of the DWL Workshop. Our event aims to create a vibrant community where professionals can forge meaningful connections, fostering collaborations that extend beyond the workshop itself.

Networking sessions, social events, and dedicated spaces for discussions will facilitate the establishment of a supportive network within the micro and nanofabrication community.

Global Inspiration, Local Impact:

Inspired by the success of EIPBN and MNE, the DWL Workshop seeks to establish a similar legacy in Australia. By bringing together international and local experts, we aim to create a unique blend of perspectives that will contribute to the growth and advancement of micro and nanofabrication technologies within the region.

Conclusion:

The DWL Workshop envisions a future where Australia stands at the forefront of micro and nanofabrication innovation. By providing a platform for collaboration, upskilling, and networking, we are committed to empowering professionals to navigate the complexities of direct write lithography

The workshop organising committee.

Welcome from the DWL Workshop Chair



Dear Attendee of the 3rd DWL workshop,

On behalf of the workshop organising committee, I warmly welcome you. We are thrilled to have nearly 150 attendees for the 3rd DWL Workshop and its lithography resist webinars. The positive feedback we've received so far is incredibly encouraging.

We aim to foster a collaborative Australian direct-write lithography community. We hope you enjoy this event and leave with new ideas and valuable connections.

We extend our gratitude to the Australian National Fabrication Facility (ANFF), especially CEO Dr. Jane Fitzpatrick, for their unwavering support in establishing this event as a landmark occasion. We also thank the Micro Nano Research Facility (MNRF) at RMIT University for hosting this event.

A very special thank you to our generous sponsors for supporting the 3rd DWL Workshop and its webinar series. Your contributions are greatly appreciated.

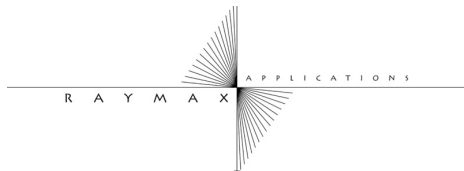
Enjoy the workshop, and let's push the boundaries of innovation together.

Michael Stuber
Melbourne Centre for Nanofabrication (MCN)

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Micro Materials Product Guide

Micro Chemicals - Germany



Photoresist Series

AZ 1500 Series
AZ 4000 Series
AZ 5200 Series
AZ ECI 3000 Series
AZ MIR Series
AZ nLOF Series
AZ 15 nXT
AZ 125 nXT
AZ 40 XT

Developers

AZ 2026 MIF
AZ 400K
AZ Developer
AZ 351 B Developer

Removers & Strippers

AZ 100
MC DMSO ULSI
Technistrip P1316 MOS
Technic NI555
AZ 910 & 920

Electroplating

Sn 100
Pd 200
Cu 100
In 100
Au 100
Ag 100
Ag 100

Solvents, Etchants, Acids & Bases (Ready to use)

MIBK VLSI
MC DMSO ULSI
Cr and Cu Etchants
KOH VLSI
TMAH VLSI
Acetic Acid VLSI
Ammonium Hydroxide VLSI

Adhesion Promoters & Thinners

TI Prime
HMDS
MC PGMEA ULSI
AZ EBR 70/30
AZ EBR 70/30

Local Chemical Stock shipped from Melbourne

AZ 726 MIF Developer
AZ 326 MIF Developer
IPA ULSI
Acetone ULSI

*Photolithography:
Basics of Microstructuring
2nd Ed - Dr Titus Rinke
(Copies Available)*

All Resist - Germany



Positive Photoresists

AR-P 1210, 1220
AR-P 3210, 3220 & 3250
AR-P 3510, 3510 T
AR-P 3540, 3540 T
AR-P 3740
AR-P 5350 SX
AR-P 3500/8

Negative Photoresists

AR-N 2210, 2220
AR-N 4340 (CAR)
AR-N 4400-05, 4400-10
AR-N 4400-25 & 4400-50
AR-N 4600-10

Protective Coatings

AR-PC 5000 series

Bottom Resists

AR-BR 5460
AR-BR 5480

E-Beam (Negative & Positive)

AR-P 617, 632 & 639 series
AR-P 641, 642 & 649 series
AR-P 661, 662 & 669 series
AR-P 6200 series (CSAR 62)
AR-P 6510 series
AR-P 8100 series (Phoenix 81)
AR-N 7520 new series
AR-N 8400 series (Medusa 84)

Ancillary Products

AR 300-80 new Adhesion Promoter
AR 600-02 / 07 / 09 Thinner
AR 600 series Developer & Stopper
AR 300 & 600 series Remover
AR 300 series Aqueous Developer (positive & negative)

Kayaku Advanced Materials - USA



Photoresist Series

SU 8
SU 8 3000
SU 8 TF 6000
SU 8 XFT
KMPP
Microposit S1800
LOR A/B/C
PMMA 950 & 495
PMGI SF
MMA(8.5)MAA Copolymer
Perminex Wafer Bonding Adhesive
KMSF Photo-dielectric

Ancillies

T Thinner
A Thinner
Omnicoat
EBR PG
Remover PG
MIBK
MIBK: IPA
SU 8 2000 Thinner

Developers

SU 8
Microposit MF-319
Megaposit MF-26A

*SU 8 2000 Series Discontinuation
Please enquire for KAM recommended alternatives*

Customised chemistries available upon request

All resist products are made to order, with longer minimum shelf lives



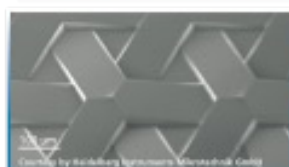
Materials and Technologies for Micro- and Nanofabrication

UV Lithography - Thick Film Processing



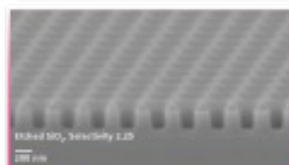
Pattern in 100µm thick positive tone resist
ma-P 1200 series
ma-P 1275HV

Greyscale lithography



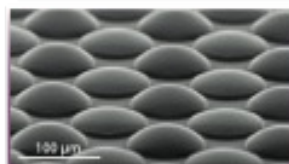
Master generation by laser direct writing in
mr-P 1275G

UV nanoimprint lithography



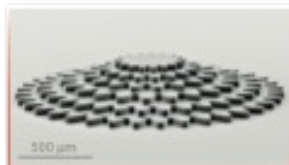
Pillar structure after pattern transfer by RIE into SiO₂ (selectivity 1:2.25) Etch mask made in **mr-NIL212FC** by UV imprinting

Inkjet Printing



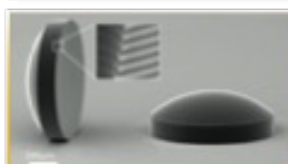
Micro lenses in **InkOrmo** adjustable lens shape by controlling droplet size and number during the inkjet printing

Dry Film - Multi Layer Lithography



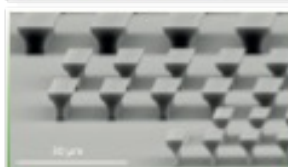
Multi layer pattern in **dry films** for complex 3D-architectures

Micro Optical Components



Microlens made of **InkOrmo**, with integrated nano grating by combination of inkjet dispensing and UV replication

Lift-Off Processing



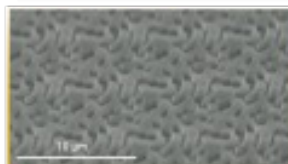
Single layer lift off pattern made by UV lithography in **ma-N 1440**

E-Beam lithography



Etch mask 200nm pattern in **ma-N2400** by e-beam lithography

UV Replication



OrmoComp®/OrmoClear®FX pattern for life science application

UV Lithography - Multi Layer Processing



Pattern in thick negative tone resist
3-layer microfluidic pattern made of **SU-8 3000** and modified **SU-8**

www.microresist.com



Think big. Print nano.



Precisely aligned 3D printing with
Aligned 2-Photon Lithography A2PL®



Quantum X align

Best-in-class 3D printer
with nanoprecision
alignment system for
photonics packaging

Your advantages at a glance

- ▶ 3D printing onto fiber facets based on fiber core detection
- ▶ 3D printing on chip surfaces or facets based on 3D topography mapping
- ▶ Scene-graph-based nanoPrintX software for aligned 3D printing with nanoprecision

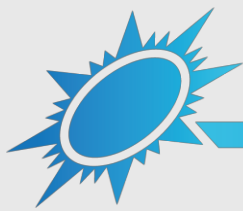
Contact our sales agent
Warsash Scientific

+61 293 190 122
sales@warsash.com.au
www.warsash.com.au

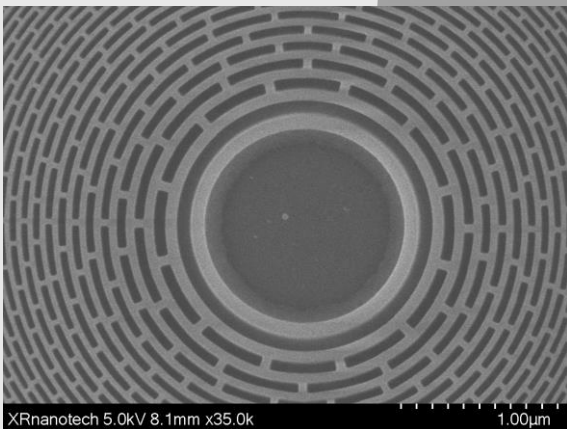


Warsash Scientific
Advanced Instruments for Research & Industry

nanoscribe.com



Supplier of materials for nanofabrication



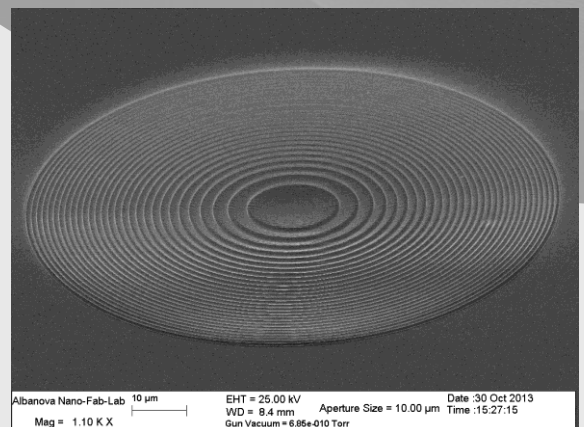
XRnanotech – Dr. Damien Eschimese –
20% HSQ Solution

High resolution negative tone
HSQ resist – New Formulation!

Positive tone SML Resist

High aspect ratio

Excellent dry etch resistance

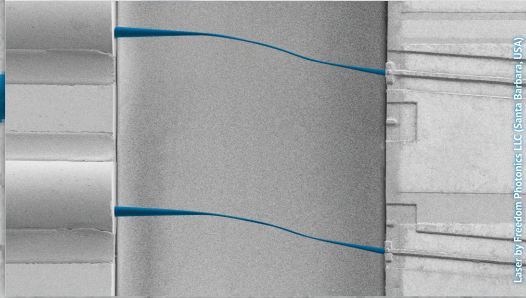


KTH – SML300

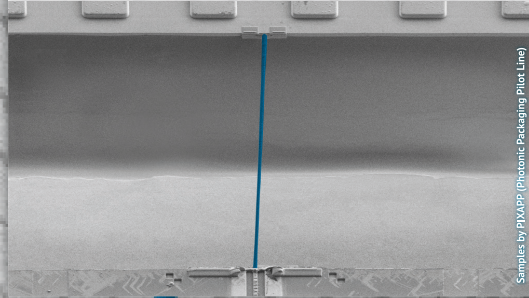
Our technical specialist are always available for
assistance with process development and product advice

Access the full potential of hybrid multi-chip integration

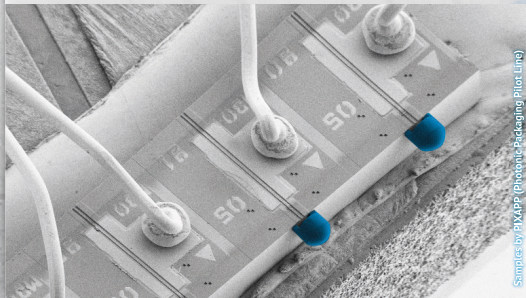
Fiber to laser



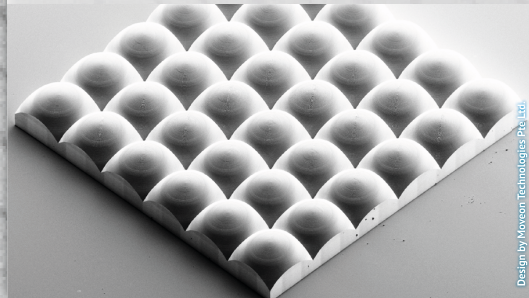
Laser to SOI chip



Lens on laser



Large scale micro-optics



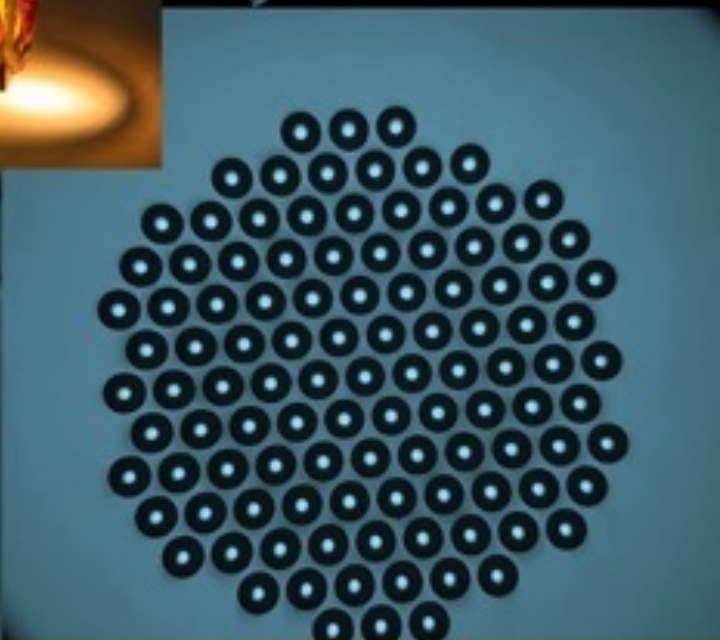
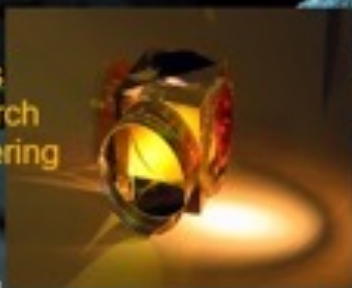
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Reliable and designed for various applications

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Microprocessing, Micromachining
Microfabrication, Lithography
Spectroscopy, Hyperspectral Imaging
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Quantum Science
Custom Optics and Etalons
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Solutions for Scientific Research
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Direct laser writers with
ultimate resolution

PICOMASTER XF

Highest-throughput
grayscale lithography

PICOMASTER-H

Dedicated for security
holograms



RAITH is a global nanotechnology solution provider defined by progress. Designed with user-friendliness in mind, our laser systems are highly versatile combining highest resolution with best performance in grayscale capabilities. Find the right tool for your vision.

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New Dimensions

Allresist – Customized e-beam resists for different applications

ALLRESIST



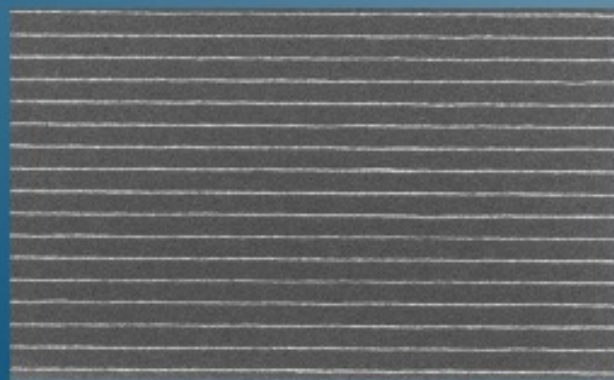
Medusa 84 SiH - SX AR-N 8400 series

Highest resolution negative HSQ resist with improved shelf life and stability



100 nm line/space structures written on silicon at
 $1000 \mu\text{C}/\text{cm}^2$ at 100 kV.

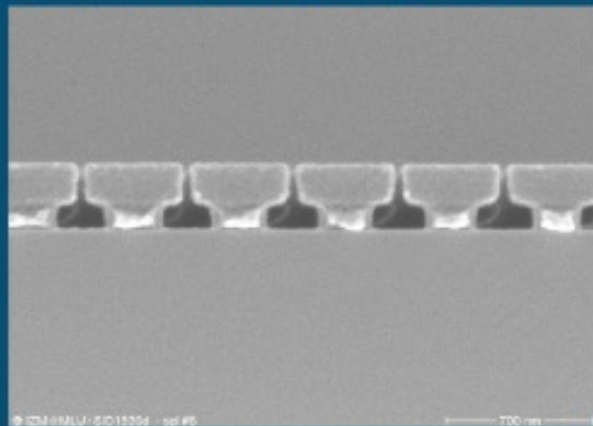
© J. Hohmann, KIT-IMT Karlsruhe



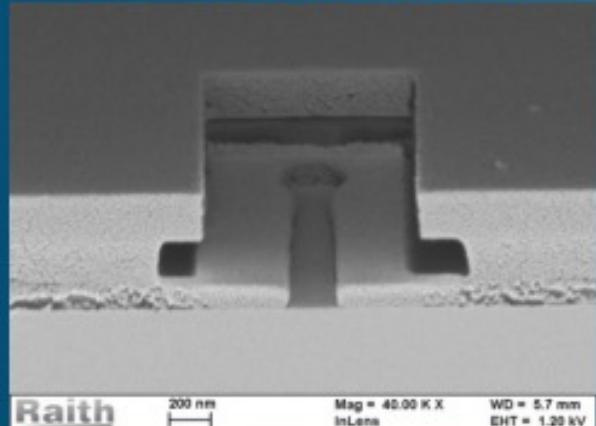
6 nm lines developed with 1% KOH. The wafer was
stored in vacuum for 10 days between coating and
lithography and showed no loss of processability or
degradation. © Raith Dortmund

CSAR 62 - AR-P 6200 series

Highest resolution (<10 nm), high contrast, and plasma etch resistant, positive e-beam resist



AR-P 6200.09 as top resist for extreme
lift-off applications



Three-dimensional resist profile for a T-gate nano-
structure. © MLU Halle

Electra 92 - AR-PC 5094.02

Conductive layer for the dissipation of charges during electron exposure

For coating on all AR e-beam resists, e.g. CSAR 62, Medusa 84 SiH, except CAR resists

**If you have any questions about our products, please
contact us at customer-consulting@allresist.de**

PROGRAM



9:00–9:05	Housekeeping
9:05–9:10	Dr. Jamie Low - RMIT <i>Welcome to Country</i>
9:10–9:15	Dr. Michael Stuber - Melbourne Centre for Nanofabrication, Australia <i>Welcome from the DWL workshop Chair</i>
9:15–9:45	Dr. Justin Wirth (virtual) - President MAEBL Inc. and Senior Research Engineer, Purdue University, Birck Nanotechnology Center <i>Toxicity of TMAH Developers and Potential Less-Toxic Alternatives</i>
9:45–10:05	Dr. Sruthi Kuriakose - Functional Nanosystems, Manufacturing, CSIRO, Lindfield, <i>Using DWL to create PMMA pillars for strongly coupled DBR mirrors</i>
10:05–10:20	Gold Sponsor: Dr. Cédric Chaminade - Raymax <i>High-resolution 2D & 3D Printing Systems for Microfabrication.</i>
10:20–11:00	Coffee Break
11:00–11:15	Gold Sponsor: Dr. Damien Jeanmaire - EM resist <i>EM Resist – Materials for Nanolithography</i>
11:15–11:55	Dr. Jan Tjepelt (virtual) - Co-Founder and CEO at FabuBlox, Inc. <i>FabuBlox: A Unified Process Design and Collaboration Platform Connecting the Nanofabrication World.</i>
11:55–12:15	Lincoln Clark - TMOS, School of Physics, University of Melbourne <i>Fabrication of phase objects using grayscale DWL</i>
12:15–12:35	Matthew Ng - RMIT University (MNRF) <i>Fabrication of large area field emitter arrays with photolithography and electron beam lithography</i>
12:35–13:15	Lunch Break

PROGRAM



13:15–13:30 Gold Sponsor: Dr. Vignesh Viswanathan - Raith
Challenging the Boundaries of maskless Laser Beam Lithography

13:30–14:00 Jeremy Gleick (virtual) - Lawrence Livermore National
Laboratory, USA
MLA Grayscale - An Introduction

14:00–14:20 Dr. Mohammad Haft - Department of Mechanical and Aerospace
Engineering, Monash University,
*The Application of Direct Laser Writing Two-Photon
Polymerization in Micro-Optics*

14:20–14:35 Gold Sponsor: Dr. Daniel Day - Warsash / Nanoscribe
Aligned micro-optics enabled by two-photon lithography

14:35–15:15 Afternoon Tea

15:15–16:00 Prof. Idriss Blakey (virtual) - Director of ANFF-Q, Australian
Institute for Bioengineering and Nanotechnology, The University
of Queensland.
Can Advanced Polymers Help Overcome the Triangle of Death?

16:00–16:20 Huan Liu - School of Physics, The University of Melbourne
*"Sketch and peel" Neon Ion Beam Patterning of Black
Phosphorus*

16:20–16:35 Gold Sponsor (virtual): Dr. Sebastian Skacel - Vanguard
Automation (a Mycronic company)
The Future of Optical Interconnects is 3D Printed Freeform Optics

16:35–16:55 Dr. Tatiana Pinedo - MCN & Dr. Elliot Cheng - UQ
Reducing the environmental impact of lithography processes.

16:55–17:00 Dr. Vijay Sivan - RMIT, Dr. Tatiana Pinedo - MCN & Dr. Elliot
Cheng - UQ
Closing

17:10 Dr. Vijay Sivan - RMIT
MNRF and D2D Tour

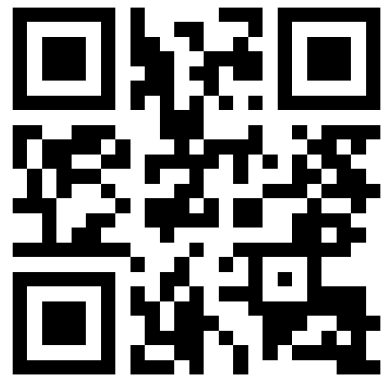
MAEBL

MEETING FOR ADVANCED E-BEAM LITHOGRAPHY

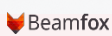
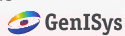
Carnegie Mellon
University

October 14 – 16, 2025

Online + Pittsburgh,
Pennsylvania, USA



Platinum Charters



Gold Charter



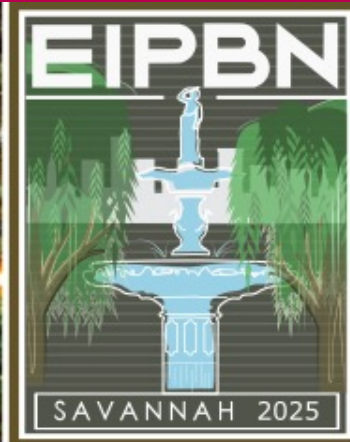
Silver Charter



Charter



The 68th International Conference on Electron, Ion, Photon Beam Technology and Nanofabrication (EIPBN) 2025



EIPBN 2025 will be held at the Hyatt Regency in historic downtown Savannah, Georgia, on the Eastern coast of the US.

EIPBN, affectionately known as “3-Beams,” is the premier gathering of scientists and engineers who are dedicated to electron, ion and photon lithography, imaging, and analysis; atomically precise fabrication; nanofabrication process technologies; related emerging technologies; and their applications in a broad spectrum of fields. This is the 68th meeting of the EIPBN, where top researchers from academia, government laboratories, and industry from around the world meet to present and discuss recent trends and future directions in these technologies.

The 2025 Plenary session welcomes three prestigious speakers relevant to this year’s focus, which will be on nanofabrication for improved precision for quantum and 2D devices:

- ★Michelle Simmons, Professor, University of New South Wales, CEO Si Quantum Computing
- ★Mark Eriksson, John Bardeen Professor and Steenbock Professor, University of Wisconsin–Madison
- ★Deji Akinwande, Cockrell Family Regents Chair in Engineering at The University of Texas at Austin Chandra Family Department of Electrical and Computer Engineering

The remainder of the conference will consist of three parallel oral sessions, including special sessions on Advanced Ion Beam Lithography, and 30 years of Nanoimprint Lithography.

Throughout the conference, there are various focused workshops and networking events, including the welcome reception, the Women in Nanotechnology luncheon, the mentoring session, and, of course, the conference banquet, to be held in the Riverside Ballroom, opening directly onto the Savannah River.

For more information, see: <https://eipbn.org/>

We are still accepting abstracts.

Please submit your abstract at: <https://softconf.com/p/eipbn2025/>

9th Thermal Probe Workshop

2nd and 3rd of April, 2025 - Zürich, Switzerland

The Thermal Probe Workshop brings together nanofabrication experts and enthusiasts from all over the world for two days of talks, posters and discussions. Nanostructures, through creative fabrication methods and applications such as 2D materials, nanodevices, photonics, nanooptics and advances in materials will be presented in a series of talks and poster presentations. The workshop leaves ample time for in-depth discussions inspired by the talks and posters.

Confirmed Speakers

- Prof. Dr. Rebecca Cheung, University of Edinburgh
- Dr. Nolan Lassaline, DTU
- Prof. Dr. Lukas Novotny, ETH Zürich
- Prof. Dr. Xiaorui Zheng, Westlake University
- Gabriel Natale, Boston College
- Prof. Dr. Kelly Morrison, University of Loughborough
- Dr. Dimitrios Kazazis, PSI
- Dr. Lotfi Berguiga, Institut des Nanotechnologies de Lyon
- Dr. Armin Knoll, IBM Zürich
- Oliver Barker, University of Liverpool
- Elisabeth Erber, LMU
- Dr. Florian Döring, XR Nanotech
- Prof. Dr. Xia Liu, Institute of Physics, Beijing

- www.tpw-zurich.com
- info-nano@himt.ch
- Manufakt8048, Bändliweg 30, Zürich, Switzerland



DWL WORKSHOP ORGANISING COMMITTEE



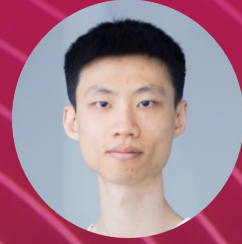
Daniel Peace
(UQ)



Elliot Cheng
(UQ)



Gayatri Vaidya
(ANU)



Jacky He
(Archer)



Jason Hwang
(Usyd)



Michael Stuibler
(MCN)



Tatiana Pinedo Rivera
(MCN)



Vijay Sivan
(RMIT)



Registration open for: DWL Workshop and Webinar Series

Join us for the 3rd DWL Workshop on Wednesday 19th February at RMIT, Melbourne proudly sponsored by ANFF. This one-day event is designed for researchers, scientists, and micro and nanofabrication experts to explore the latest advancements in Direct Write Lithography (DWL) and push the boundaries of micro and nanoscale fabrication. Don't miss this opportunity to connect with industry leaders!

Additionally, attendees will benefit from a series of 5 educational webinars beginning in October 2024. These webinars will deepen your understanding of lithography resists, from the basics to more complex uses.

Want to present at the workshop?

We're calling on researchers, scientists, and experts in micro and nanofabrication to share their insights at the "Innovative Research in Direct Write Lithography Workshop." If you're working on new techniques, applications, or advancements in direct write lithography, we want to hear from you. For details on how to submit your abstract, scan the QR code on the right or [click here](#).



	Melb, Syd	Adelaide	Perth	Berlin	NY	LA	Topic / Title	Facilitator / Speaker
W1	AEDT 11:00 23.10.24	ACDT 10:30 23.10.24	AWST 08:00 23.10.24	CEST 02:00 23.10.24	EDT 20:00 22.10.24	PDT 17:00 22.10.24	The History of Lithography Resists	Christopher K Ober* (Cornell University)
W2	AEDT 16:00 20.11.24	ACDT 15:30 20.11.24	AWST 13:00 20.11.24	CET 06:00 20.11.24	EST 00:00 20.11.24	PST 21:00 19.11.24	Basics of Micro Structuring – Photolithography with the AZ and MC range of photoresists	Titus Rinke (Microchemicals)
W3	AEDT 14:00 11.12.24	ACDT 13:30 11.12.24	AWST 11:00 11.12.24	CET 04:00 11.12.24	EST 22:00 10.12.24	PST 19:00 10.12.24	The Physics of Lithography Resists	Scott Lewis (Caltech)
W4	AEDT 17:00 22.01.25	ACDT 16:30 22.01.25	AWST 14:00 22.01.25	CET 07:00 22.01.25	EST 01:00 22.01.25	PST 22:00 21.01.25	Chemical fundamentals and innovations in MRT's photoresist portfolio	Anja Voigt, Christine Schuster, Arne Schleunitz (micro resist technology)
W5	AEDT 11:00 12.02.25	ACDT 10:30 12.02.25	AWST 8:00 12.02.25	CET 01:00 12.02.25	EST 19:00 11.02.25	PST 16:00 11.02.25	EBL resists and their exposure mechanisms: from PMMA to Hydrogels	Leonidas E Ocola (IBM T.J. Watson Research Centre)
W6	AEDT 14:00 05.03.25	ACDT 13:30 05.03.25	AWST 11:00 05.03.25	CET 04:00 05.03.25	EST 22:00 04.03.25	PST 19:00 04.03.25	What are the challenges for creating a next generation resist?	Scott Lewis (Caltech)

* Please be aware that the webinar you'll be watching is a pre-recorded session. After the presentation, there will be a live Q&A segment with Christopher Ober.

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