

CRAFT RESEARCH SYMPOSIUM









THIS IS A BLANK PAGE FOR YOUR NOTES



TABLE OF CONTENTS

Welcome Messages	1-2
About CRAFT	3
Maps to Venue & Floor Plan	4-5
Event Program	6-7
About Our Keynote Speakers	8-9
Podium Presentations	10
Poster Presentations	11-13
Spotlight Presentations	14-15
Event Sponsors	16
Organizing Committee	17

WELCOME MESSAGE

Welcome to the 2025 CRAFT Symposium, proudly presented by the Centre for Research and Applications in Fluidic Technologies (CRAFT) in collaboration with Unity Health Toronto. We are thrilled to have you with us as we delve into the newest breakthroughs and innovations in microfluidic lab-on-chip technologies.

CRAFT brings together leading researchers from the National Research Council of Canada's Medical Devices Research Centre, the University of Toronto, and Unity Health Toronto. Through this strong collaborative network, we are advancing state-of-the-art microfluidic research and development. Our goal is to strengthen the entire microfluidics manufacturing pipeline—supporting Canada's leadership in developing and translating diagnostics, organ-on-chip systems, and biofabrication technologies. These efforts are poised to enhance healthcare outcomes for Canadians and fuel a dynamic, globally competitive industry.

Thank you for joining us at the 2025 CRAFT Symposium. We are extremely excited about this year's speaker lineup and the engaging presentations by our trainees and staff. Your participation at events like this one will help drive progress in healthcare and the future of microfluidic innovation.

Sincerely, Dr. Hagar Labouta

Chair of the 2025 CRAFT Research Symposium

CO-DIRECTORS MESSAGE

Welcome to the 2025 CRAFT Symposium, hosted by the Centre for Research and Applications in Fluidic Technologies (CRAFT) in partnership with Unity Health Toronto. We look forward to five exciting keynote presentations. CRAFT trainees and scientists are excited to share the latest in microfluidic lab-on-chip innovations with you.

CRAFT is a nationally unique collaborative research center supported by the National Research Council of Canada, by the University of Toronto via the Institutional Strategic Initiatives Office and the faculties of Pharmacy, Medicine, Arts & Science, and Engineering, and by Unity Health Toronto. Together with all of you, we aim to develop new microfluidics-enabled diagnostic, organ-on-chip, and biofabrication approaches to improve healthcare.

If we count CRAFT-predecessors, this is already the 18th such meeting. And we are particularly happy to host the first CRAFT Symposium at Unity Health Toronto!

We look forward to an exciting symposium with many new research results. We encourage you to stay actively involved in CRAFT events and research projects, to participate in new initiatives together with us, explore licensing and commercializing inventions, and participate in educational activities such as the Microfluidics Professional Course (July 9-11).

Sincerely,

Dr. Claudia Dos Santos, Unity

Dr. Teodor Veres, NRC

Dr. Axel Guenther, UofT



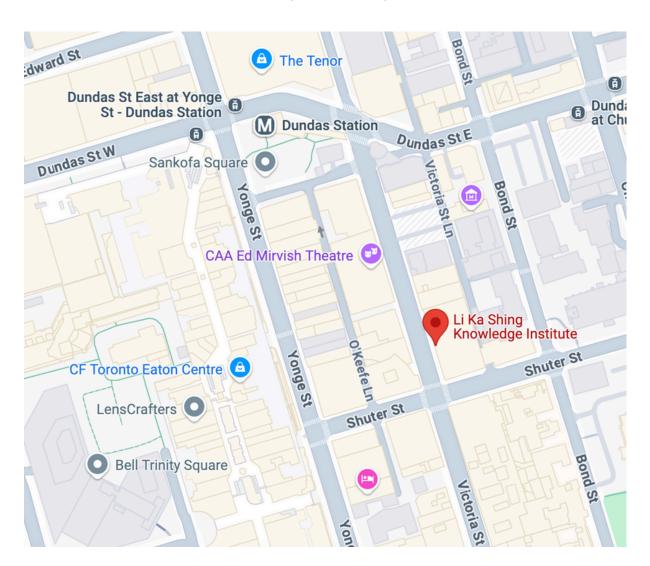
ABOUT CRAFT

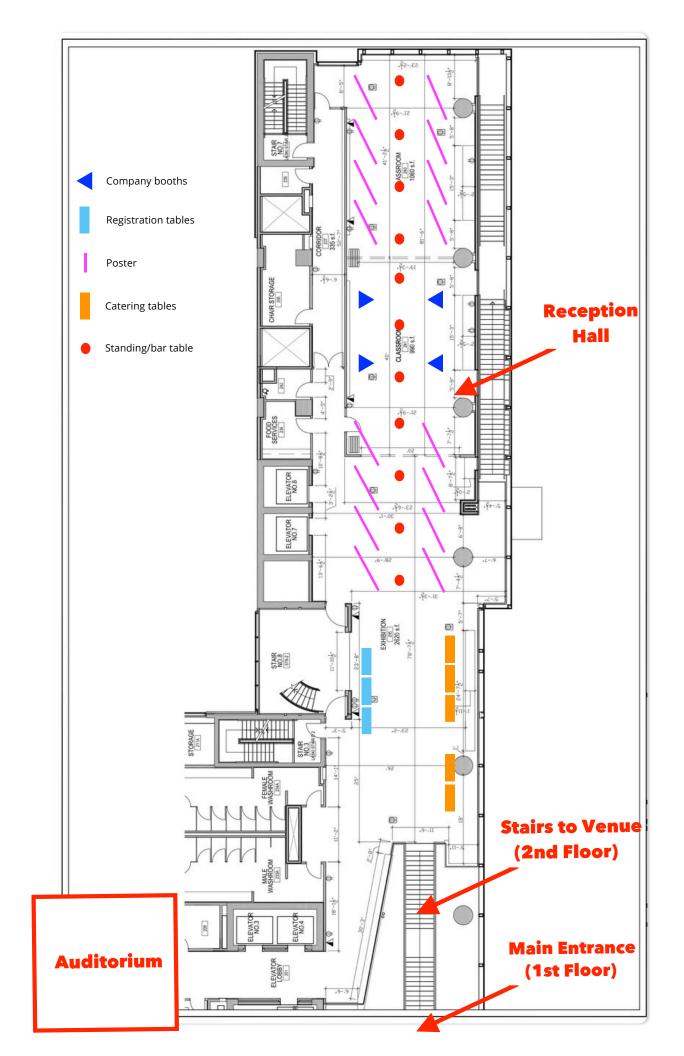
The Centre for Research and Applications in Fluidic Technologies (CRAFT) is a collaborative partnership between the University of Toronto (U of T), the National Research Council of Canada (NRC), and Unity Health Toronto (UHT). CRAFT supports the development of microfluidics-enabled systems for both industrial and clinical applications. Its research activities are focused on three key application areas: Diagnostics & Bioanalytics, Organ-on-a-Chip, and Biofabrication. CRAFT aims to advance the science and technology of microfluidics; provide Canadian trainees with unparalleled, hands-on learning opportunities across government, private sector, and academic laboratories; accelerate the creation, commercialization, and adoption of cutting-edge microfluidic technologies for biomedical applications; and stimulate industrial growth to support the large-scale manufacturing of these technologies within Canada.CRAFT also hosts graduate courses, academic visitors, and professional training programs, annually welcoming and training hundreds of highly qualified personnel.

CRAFT offers comprehensive expertise and infrastructure for rapid device prototyping and fabrication, preclinical validation, and scalable manufacturing under certified conditions, enabling smooth technology transfer to industry. Additionally, CRAFT operates clinical pods at St. Michael's Hospital (UHT) to support clinical validation efforts in collaboration with its partner institutions. Across its two campuses, CRAFT is equipped with more than \$50 million in state-of-the-art infrastructure, including Class 1,000 cleanrooms, biosafety level 2 laboratories, and over 150 high-tech instruments. The University of Toronto site operates as an openaccess facility, serving five institutions, 80 research groups, 350 users, local startups, and government scientists. The NRC Boucherville site spans 6,500 sq. ft. and supports rapid scale-up of device fabrication under certified conditions transferable to industrial manufacturing.

MAP OF **EVENT VENUE**

209 Victoria St, Toronto, ON M5B 1T8





EVENT **PROGRAM**

Time	Activity	Location
7:45 am – 8:45 am	Registration & Breakfast	Reception Hall
8:45 am – 9:00 am	Opening Remarks Dr. Tim Rutledge & Dr. Ori Rotstein	Auditorium
9:00 am – 9:15 am	CRAFT Update Dr. Axel Guenther & Dr. Teodor Veres	Auditorium
9:15 am – 10:15 am	Diagnostics Keynote Dr. Andrew deMello	Auditorium
10:15 am – 10:30 am	Coffee Break	Reception Hall
10:30 am – 11:30 am	Biofabrication Keynote Dr. Athina Markaki	Auditorium
11:30 am – 12:30 pm	Spotlight Presentations Unity Research	Auditorium
12:30 pm – 1:30 pm	Lunch	Reception Hall
1:30 pm – 2:45 pm	Poster Session	Reception Hall
2:45 pm – 3:45 pm	Organ-on-a-Chip Keynote Dr. Sarah Hedtrich	Auditorium

EVENT **PROGRAM**

Time	Activity	Location
7:45 am – 8:45 am	Breakfast	Reception Hall
8:45 am – 9:00 am	Opening Remarks Dr. Christopher Yip	Auditorium
9:00 am – 10:00 am	Industry Keynote Dr. José Garcia-Cordero	Auditorium
10:00 am – 10:30 am	Coffee Break	Reception Hall
10:30 am – 11:00 am	Acceleration Consortium Spotlight Dr. Yimu Zhao	Auditorium
11:00 am – 12:00 pm	Podium Presentations	Auditorium
12:00 pm – 1:00 pm	Lunch	Reception Hall
1:00 pm – 2:00 pm	Drug Discovery & Device Design Keynote Dr. Elliot Chaikof	Auditorium
2:00 pm - 2:30 pm	Closing Remarks & Award Ceremony Dr. Hagar Labouta	Auditorium

ABOUT OUR KEYNOTE SPEAKERS



Dr. Andrew deMello

ETH Zurich



Dr. Athina Markaki University of Cambridge



Dr. Sarah Hedtrich
University of British Columbia

Microfluidics for blood-based diagnostics

Andrew is currently Professor of Biochemical Engineering and Deputy Chair in the Department of Chemistry and Applied Biosciences at ETH Zurich. Prior to his arrival in Zurich, he was Professor of Chemical Nanosciences and Head of the Nanostructured Materials and Devices Section in the Chemistry Department at Imperial College London. He is also co- founder of two spin out companies that commercialize microfluidic technologies. Science originating from the deMello group has been recognized through multiple awards, including the 2020 Advances in Measurement Science Lectureship Award (American Chemical Society), the 2021 Simon-Widmer Award (Swiss Chemical Society) and a 2021 Mendel Lectureship (Academy of Sciences of the Czech Republic).

Bioengineered vascular networks and grafts

Athina Markaki is a University Professor in the Engineering Department at the University of Cambridge, where she leads the Materials Engineering and Material-Tissue Interaction Group. After completing post-doctoral positions at Cambridge and MIT, along with a year in industry, she was appointed to a lectureship in the Engineering Department. She is the recipient of the 2017 Rosetrees Trust Interdisciplinary Award, a European Research Council Starting Grant (2010), an Advanced EPSRC Fellowship (2005), the 2004 De Montford Award at "SET for Britain," the Young Scientist Prize in 2003 at the 5th Euromech Solid Mechanics Conference (ESMC-5), and awards from the State Scholarships Foundation, the Evgenidio Foundation, and the Technical Chamber of Greece.

Human (disease) models to Tackle Inflammatory and Genetic Diseases of Human Epithelia

Prof. Hedtrich obtained her PhD in Pharmaceutical Sciences from the Freie Universität Berlin in 2009. She held one of the prestigious Johanna-Quandt-Professorships at the Berlin Institute of Health at Charité in Berlin and serves now as a recently appointed Tier I Canada Research Chair in Human Disease Modeling at the School of Biomedical Engineering at the University of British Columbia. Her research centers around inflammatory and genetic diseases of human epithelia with a focus on skin and lungs and bioengineering of complex, human disease models which are leveraged to develop personalized next-generation therapies. She co-/authored over 95 peer-reviewed journal articles in high-impact journals including the ACS Nano, Small, Nature Reviews Bioengineering, and EMBO Molecular Medicine.

ABOUT OUR KEYNOTE SPEAKERS



Dr. José Garcia-Cordero Roche's Institute of Human Biology

Advanced microfluidic platforms for scalable organoid culture

José leads the Microtechnologies group at Roche's Institute of Human Biology (IHB) since August 2021. His group develops innovative technologies that automate and enhance the throughput of in vitro model systems. The team's work in microengineering, advanced materials, biosensors, and instrumentation has produced nearly a dozen patents to date. He also established the infrastructure and facilities for microfluidic device prototyping at IHB. Prior to joining Roche, José was an Associate Professor at Cinvestav (Mexico) and an Adjunct Assistant Professor at Mayo Clinic (USA), following a postdoctoral fellowship at EPFL (Switzerland).



Dr. Elliot Chaikof Harvard University

Addressing challenges in thrombosis and bleeding: From drug discovery to device design

Dr. Chaikof's research interests lie at the interface of medicine, chemistry, materials science, and engineering, with applications in drug discovery, cellbased therapies, and tissue engineering. He has been engaged in multiple research consortia, including serving as the Emory University Principal Investigator of the NSF sponsored Georgia Tech/Emory Engineering Research Center (ERC) for the Engineering of Living Tissues and as Principal Investigator of NIH Common Fund Programs in Glycoscience and Somatic Cell Genome Editing (SCGE). Within the National Academy of Medicine, Dr. Chaikof recently served as Chair of Section 1 (Engineering Sciences), founding Co-Chair of the Health and Technology Interest Group (IG18), and was a member of the Committee on Emerging Science, Technology, and Innovation (CESTI). Within the National Academies, Dr. Chaikof served as Co-Chair of the Committee on Biomedical Engineering Materials and Applications (BEMA) and served on the Standing Committee of Biotechnology and National Security Needs. He currently serves as a member of the National Materials and Manufacturing Board (NMMB) and the Committee on National Security Implications of Transdisciplinary Biotechnology in support of the National Security Commission on Emerging Biotechnology of the U.S. Government. Among other awards, Dr. Chaikof is the recipient of the Class of 2020 Outstanding Faculty Mentor Award from Harvard Medical School.

PODIUM PRESENTATIONS

Time of presentation	Speaker	Title
11:00 AM - 11:10 AM	Sargol Okhovatian	Primitive macrophages support vasculogenesis, enhance tissue functionality and reduce inflammation of in vitro left ventricle model
11:10 AM - 11:20 AM	Xin (Suzie) Song	Mechanically mitigating irradiation- induced osteocyte damage and regulating breast cancer metastasis using a microfluidic platform
11:20 AM - 11:30 AM	Viktoriya Pakharenko	Lignin-biotransformed α-cyano-derivatives enables cancer immune-therapy
11:30 AM - 11:40 AM	Omar Rahman	PEGDA/GelMA microfluidic system for high-throughput encapsulation of cancer spheroids to recapitulate the ECM microenvironment
11:40 AM - 11:50 AM	Noah Franco	BIAP: Biocompatible inks for advanced 3D printing
11:50 AM - 12:00 PM	Amr Abostait	Al-driven optimization of lipid nanoparticles for fetal gene therapies

POSTER **PRESENTATIONS**

Poster #	Presenter	Title
1	Han Shao	A tumour-on-a-chip model with concentric vessel networks for studying tumour cell infiltration and vessel co-option
2	Karl Wagner	Epicardial-derived extracellular vesicles modulate matrix gene expression in an engineered model of cardiac ischemia-reperfusion injury
3	Kimia Abedi	Automated fabrication of ultra-thin extracellular matrix-derived membranes for organ-on-a-chip applications
4	Yuming Zhang	Microfluidic production of ultrathin, handleable collagen sheets exhibiting toe-heel tensile behavior
5	Kimberly Seaman	Mechanical loading of osteocytes regulates prostate cancer-bone mineral interactions in a novel microfluidic co-culture assay
6	Mahmoud Sakr	Cardiac chaos on demand: Orchestrating arrhythmias in cardiac tissue-on-chip
7	Yufeng Zhao	Hydrogel-encapsulated whole-cell sensor for biliverdin detection
8	Mohamed Elsayed	Towards analysis at the point of need: A digital microfluidic approach to processing multi-source sexual assault samples
9	Tanmay Gupta	Extracellular matrix inspired bioink towards 3D bioprinting of load- bearing bone tissue
10	Bahareh Chaichypour	Chitosan nanoparticle synthesis: Voltage-controlled size distribution on a micropost-based acoustofluidic platform
11	Elizabeth Keane	Vascularized crypt-patterned miniature colons with immune cell recruitment for IBD modelling

POSTER PRESENTATIONS

Poster #	Presenter	Title
12	Shengxi Lan	Ultra-sensitive diagnostic platform using a metal nanoparticle integrated freestanding hydrogel
13	Chantel Campbell	Ultrathin collagenous angle-ply structures with tunable biomechanics for small diameter blood vessel grafting
14	Dylan Siriwardena	Development of a stem cell-based microfluidic co-culture model of early embryo development
15	Niloofar Ghasemzaie	Microbubble-assisted porosity modulation for tunable scaffold architectures in tissue engineering
16	Daniel Reddy	Target acquired: A modified substrate for sampling dried matrix spots with liquid microjunction – surface sampling probe – mass spectrometry
17	Jeremy Newton	Mechanical modelling of pulmonary hypertension using a matrix- derived microphysiological cell stretching platform
18	Kevin Perera	A patient-specific cartilage and synovium joint-on-a-chip model for osteoarthritis
19	Steven Tran	Generating microfluidic nanobubbles at high lipid concentrations enhances ultrasound echogeneicity
20	Niloofar Ghasemzaie	Redesigning the ATPSpin platform: A 3D-printed solution for microfluidic fiber fabrication
21	Jitao Ding	Ultrathin, minimally invasive surface electrodes for activating neural precursor cells (NPCs)

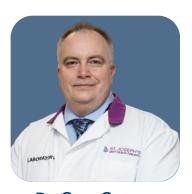
POSTER **PRESENTATIONS**

Poster #	Presenter	Title
22	Luis Pérez Dávalos	One stone, two birds: Harnessing microfluidics to develop placental-targeted nanoparticles and assess their efficacy in a placenta-on-a-chip
23	Yasmin Abdelkader	Integrated breast tumor and placenta-on-a-chip model to define the molecular profile of pregnancy-associated breast cancer
24	Nil Aksu	OASIS: Organ-on-a-chip automated simulation and iterative solution
25	Reese Wunsche	Hydrogel microparticles for tunable release of extracellular vesicle payloads in vivo
26	Shikhar Davla	Simulating ultra-low interfacial tension all-aqueous microfluidic droplets using computational fluid dynamics
27	Sina Azarsa	Engineered hydrogels for enzymatically controlled release of antibodies
28	Ilya Yakavets	Machine learning-assisted exploration of multidrug-drug administration regimens for organoid arrays
29	Madeleine Ludlowc	Human blastocyst-derived placenta barrier for drug transport studies
30	Mahmoud Abdelkarim	3D-printed four-way microfluidic hydrodynamic focusing for high- throughput synthesis of nanoparticles
31	Damra Camat	Single nucleus RNA-sequencing demonstrates regenerative properties of exogenous IL-4 in murine precision-cut liver slices
32	Bernadette Ng	Automated and scalable phage susceptibility testing using digital microfluidics
33	Tae-Hyeong Kim	An integrated microfluidic system for rapid and easily accessible sequencing of the intensive care unit microbiome

SPOTLIGHT PRESENTATIONS UNITY HEALTH



Dr. John Marshall



Dr. Greg German



Dr. Hagar Labouta

Monitoring the ICU microbiome

Dr. John Marshall is a Professor of Surgery and Critical Care Medicine at the University of Toronto and a Senior Scientist at the Li Ka Shing Knowledge Institute of Unity Health Toronto. He earned his medical degree at the University of Toronto and completed postgraduate training at Dalhousie and McGill universities. He has held several prominent leadership roles in international critical care organizations, including InFACT, ISF, CCCTG, and WFSICC. Dr. Marshall is the Canadian lead for the REMAP-CAP trial and co-chairs a WHO committee on COVID-19 clinical management. He has published over 600 peer-reviewed works, delivered more than 1,200 lectures worldwide, and has been cited over 180,000 times.

Microfluidics for bacteriophage therapy susceptibility testing to support clinical trials

Dr. Greg German MD PhD FRCPC DTM&H FIDSA is a Unity Health Toronto medical microbiologist and Li Ka Shing Knowledge Institute clinician investigator. He is also the University of Toronto's Bacteriophage Therapy Research and Innovation Professor. He completed his PhD at Arizona state University on bacteria viruses otherwise known as phages, and later his MD and medical microbiology residency at the University of Ottawa. He has treated multiple patients with phage therapy either directly at St. Joseph's Health Centre chronic infection clinic or indirectly. He leads on Phage Therapy through multiple groups as cofounder and clinical director of Phage Canada, and Chair of Global Clinical Phage Rounds a group of over 400 mostly physicians that discuss cases internationally.

Prenatal nanomedicines on a chip

Dr. Hagar Labouta is a Keenan Professor of Medical Discovery at Unity health Toronto and Assistant Professor at the University of Toronto at Leslie Dan Faculty of Pharmacy and Institute of Biomedical Engineering. She received her Ph.D. from Saarland University (Germany) and completed several Postdocs at Helmholtz institute (Germany), and University of Calgary. Her team uses microfluidics to design nanoparticles for applications related to Women's Health, and evaluate them using organ-on-a-chip models. She has won several awards including Member of the Year Award from the Controlled Release Society (USA), Interstellar Award from New York Academy of Sciences (USA), Innovation and Career Development Award by the Biomedical Engineering Society (USA), Apotheker Jacob Prize (Germany).

SPOTLIGHT PRESENTATIONS ACCELERATION CONSORTIUM



Dr. Yimu Zhao

Gear up for the Acceleration - New era for the biological discovery

Dr. Yimu Zhao is a Staff Scientist at the Acceleration Consortium at the University of Toronto, specializing in cardiac tissue engineering, organ-ona-chip technologies, and automation-driven biomedical research. Her work focuses on developing advanced in vitro platforms to enhance drug discovery, disease modeling, and regenerative medicine applications. Dr. Zhao completed her postdoctoral training at Columbia University and the University of Toronto, where she focused on engineering organspecific vascular networks and multi-organ systems to model drug responses and disease phenotypes across multiple tissue types. She earned her Ph.D. in 2019 under the supervision of Dr. Milica Radisic at the University of Toronto. During her doctoral studies, she designed and developed the Biowire™ II Organ-on-a-Chip platform—a drug-inert tissue culture and testing system that integrates super-elastic biomaterials as biosensors to cultivate 3D, adult-like cardiac tissue arrays. This platform merges principles from developmental biology, tissue engineering, and microfluidics, enabling the generation of chamber-specific, healthy, and patient-derived diseased cardiac tissues. It is compatible with pharmaceutical industry workflows and provides continuous functional readouts through material-based biosensors.

Dr. Zhao is also a co-founder of TARA Biosystems, a biotechnology company established based on the Biowire™ II technology, which was acquired by Valo Health in 2022. She has authored over 40 high-impact, peer-reviewed publications and holds four patents. Her research contributions have been widely recognized, including a first-author publication featured and highlighted in Cell.

EVENT SPONSORS













ORGANIZING COMMITTEE



Dr. Hagar Labouta



Dr. Alaa Alsaafin



Abdul Wasay



Kayla Soon



Dr. Dan Voicu



Victor Sit

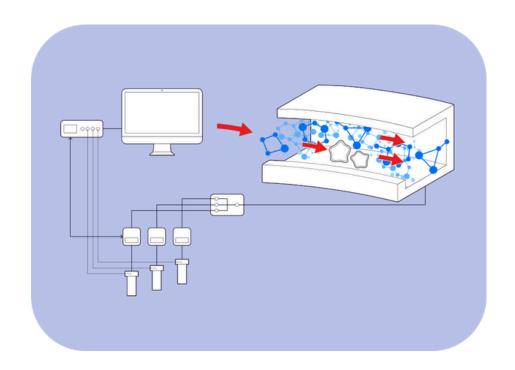


Dr. Dennis Ng

Add a New Dimension to Your Imaging



ZEISS Dynamics Profiler



Measure flow rates in sub-micron volumes without the need to track particles

Product Trailer



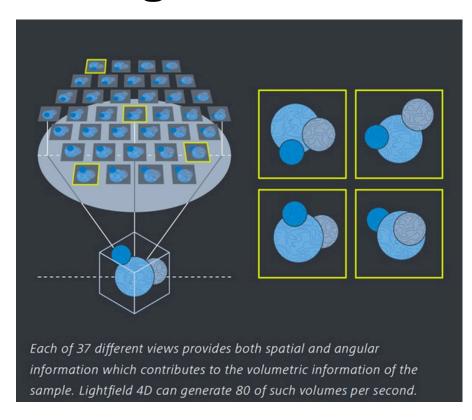
Learn More



Minimum light exposure. Maximum information gain.



Lightfield 4D



Instantaneous Confocal Imaging

One Snap. One Volume.

Launch Event



Learn More



CYTO-CLEAR MONOLITHIC DEVICES

3D MATERIAL







Min 80µm



Inert under



No Coatings o Polishings A broad-spectrum biocompatible 3D material with over 90% cell viability across multiple cell lines. A new generation of monolithic devices.

>90% CELL VIABILITY ACROSS CELL LINES

The Cyto-Clear Photopolymer Resin has been specifically formulated for broad-spectrum biocompatibility and cell viability, undergoing rigorous cytotoxicity testing across multiple cell lines. Validated through live/dead cell staining, successful tests include sperm cells, monocytes, endothelial and epithelial cells, to name a few.

ON-CHIP EVALUATIONS AND MICROSCOPY

Monolithic devices require high optical transparency to effectively monitor fluid flow and interactions within microchannels, and the Cyto-Clear Photopolymer Resin delivers excellent clarity with minimal haze and no yellow tint. It is non-reactive to fluorescent light, allowing for imaging and microscopy with fluorescent markers.

Formulated for Cell Viability

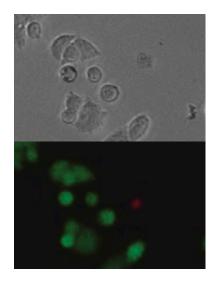


No Internal Channel Supports

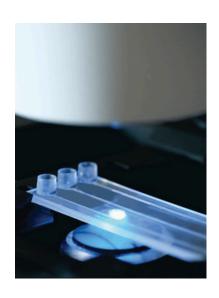




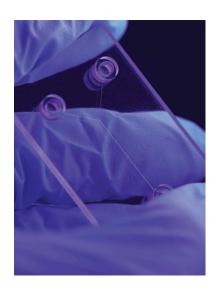
3 KEY MATERIAL PROPERTIES



CELL VIABILITY



OPTICAL TRANSPARENCY



LOW AUTOFLUORESCENCE

WWW.CADWORKS3D.COM



Microfluidic Chip Manufacturing

Innovate, design, and manufacture microfluidic chips in house.

Microfluidics is revolutionizing industries like diagnostics and drug delivery by enabling precise control of tiny fluid volumes within intricately designed microchannels. At the heart of this innovation are microfluidic chips, which require extreme precision in their manufacturing to ensure optimal performance. This is where DATRON CNC machines excel. With high-speed spindles capable of milling ultra-fine features, industry-leading X and Y-axis accuracy, and an intuitive user interface that simplifies operation, DATRON machines make it easier than ever to prototype and produce high-quality microfluidic devices.





Application Consultation

Our engineers review your parts and workflow to help determine the right solution for your needs.



Immediate Results

In-stock machines ship usually within a week and can start making parts within hours after being installed.



Service & Support

The DATRON Dynamics support team provides training, local telephone support, internal diagnostics, preventative maintenance programs, and customer exchangeable parts to help help keep your investment up and running.

DATRON

Key Features For Microfluidic Machining

Precise, High-speed Machining

DATRON CNC machines offer the precision, efficiency, and consistency required for microfluidic chip production. High-speed spindles, reaching up to 60,000 RPM, allow the use of ultra-small tools for clean, detailed milling of intricate channels. Exceptional X and Y-axis accuracy ensures microfeatures are machined to exact specifications, a critical factor for controlling fluid flow in microfluidic devices.

Secure Workholding

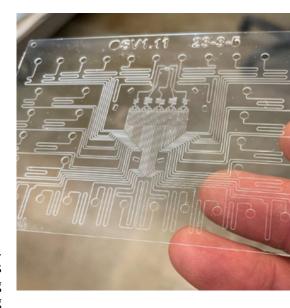
Precision and stability are critical in microfluidic chip manufacturing, where even the slightest material distortion can impact performance. DATRON's vacuum table technology provides a secure, uniform clamping force, preventing warping or shifting during machining. This ensures precise, consistent milling of microchannels, even on ultra-thin substrates. By eliminating the need for mechanical clamps, DATRON's

vacuum tables protect delicate materials while enabling faster setups, making them essential for high-precision applications.

Thermal Stability Systems

To maintain machining consistency, DATRON's thermal stability systems regulate temperature, reducing material expansion and preserving Integrated accuracy. probing technology further refines process, mapping surface variations and automatically adjusting milling depth in real time to prevent inconsistencies. Meanwhile, intuitive touchscreen interface simplifies operation, making highprecision machining accessible even in laboratory settings.

With advanced features designed specifically for precision micromachining, DATRON CNC technology provides the accuracy, reliability, and efficiency needed to drive innovation in microfluidic manufacturing.





Learn More

DATRON CNC machines and high-speed spindles will increase your feed rates and reduce cycle times. The machines and software are optimized so that the entire machining process or workflow is fast and efficient saving you time and money. Reach out to learn more about our process.

DATRON Dynamics, Inc. www.DATRON.com
Tel: 603.215.5850
sales@datron.com



Join us in reshaping the future of microfluidics technologies – where every partnership is a step toward transformative innovation.

General inquiries craft@utoronto.ca

Facilities in Toronto dan.voicu@utoronto.ca

Facilities in Boucherville caroline.miville-godin@nrc-cnrc.gc.ca

Partnership opportunities partnerwithcraft@utoronto.ca



