Advanced Biomedical Instrumentation Centre
先進生物醫學儀器中心

Advanced Biomedical Instrumentation Centre

# NEWSLETTER 2023 ISSUE 01

## MID-SEASON HIGHLIGHTS

### Bringing together Academics, Industries, Government and Stakeholders, ABIC organized the 1st Translation and Commercialization of Deep Tech Biomedical Innovation Symposium

On 21 March 2023,
ABIC hosted a one-day comprehensive program featuring panel discussions and talks that cover global trends in biomedical innovation and the associated supportive eco-systems.

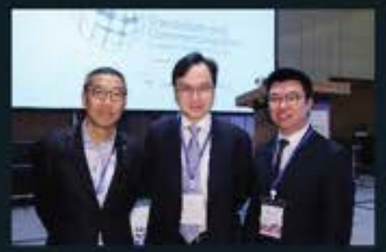
Translation and Commercialization

The symposium brings together over 30 thought-provoking leaders, such as top-notch international scientists, medical experts, industrialists, as well as stakeholders in the I&T ecosystem, to share their successful strategies in overcoming challenges and grasping opportunities during the different phases of biomedical translation.

Prof. Sun Dong, JP, the Secretary for Innovation, Technology and Industry, delivered keynote speech at the symposium.

Prof. David Weitz suggested that research fellows should be readily prepared for their start-up initiatives.

(From left) Prof. Anderson Shum, Prof. David Weitz, Prof. Dennis Lo, Prof. CT Lim and Prof. Tuomas Knowles addressed how scientists became entrepreneurs in the panel discussion.



(From left) Mr. Albert Wong, Prof. Dennis Lo and Prof. Anderson Shum contributed to the biomedical field that benefits the community.


(From left) Prof. Anderson Shum, Prof. Sun Dong and Mr. Albert Wong marked the commencement of the symposium.

(From left) Dr. Cecilia Tsui, Mr. Jason Chiu, Mr. Joseph Fung, Mr. Kevin Orr and Prof. Anderson Shum formed a panel to explore the strengthening of collaborative ties between industry, government and academia, fostering sustainable economic growth and long-term competitiveness.

The symposium also aims to stimulate discussions that foster research translation and commercialization in the biomedical / healthcare sector. The event is co-organized with HKSTP, and supported by InvestHK, HKTDC and Hong Kong Startup Council.

# CENTRE ACTIVITIES

## LUNCH BREAKTHROUGH SESSIONS

On 16 May 2023, ABIC hosted a seminar titled "Innovative strategies for commercializing deep tech biomedical technologies", featuring Dr. Gary K. Ng, Senior Director of Product Marketing from Ally Therapeutics Inc., and Mr. Ryan P. Kelly, Director of Business Development from Abveris, a division of Twist Bioscience.

Keynote speakers shared their expertise with insightful advice, addressing the significance of commercializing biomedical technologies and devising effective go-to-market strategies. Prof. Xu Lei also joined Gary and Ryan for in-depth discussions.

The Lunch Breakthrough sessions aim to provide an exclusive opportunity for our centre members to interact with and learn from domain experts. ▶


## THE SECOND LUNCH BREAKTHROUGH SESSION

Held on 1 June 2023, titled "Defining the right market opportunity and how to think about the talent and resources you need", the session featured Mr. Adrian Lam, Managing Partner of Bio World Ventures.

Mr. Lam shared valuable insights on identifying and pursuing the best market opportunities based on research outcomes, making him an invaluable asset for assembling teams with the necessary skillsets and resources to prosper in competitive markets. Participants enjoyed delicate Japanese casual lunch bento. ▼


# ABIC inventions excel at International Exhibition of Inventions of Geneva

**The Centre continues its pioneering success in the commercialization of research achievements stemming from the two award-winning technologies featured at the 48th International Exhibition of Inventions of Geneva**

ABIC excelled at the 48th International Exhibition of Inventions of Geneva held from 26 to 30 April 2023.

Two inventions from ABIC Pitching Corner, namely "DipμChip - Capillary Microfluidic Platform for Point-of-care Diagnostics" developed by MicroDiagnostics Limited, and "Aptasensor for Sepsis Diagnostic", were each awarded the Gold Medal and Bronze Medal respectively.

The international recognition symbolizes our Centre's pioneering success in the commercialization of research achievements. ABIC will continue translating advanced biomedical instrumentation from research and development into tangible solutions with deep-tech innovations.

## ABIC'S AWARD-WINNING INVENTIONS /



### Gold Medal

### DipμChip - Capillary Microfluidic Platform for Point-of-care Diagnostics

*Prof. Anderson Shum, Dr. Hassan Sammer Ul, Mr. Nicky Lee*

DipμChip is an automated capillary microfluidic-based point-of-care (POC) microsystem allowing rapid and portable detection of various high-impact and mortality diseases. It is designed and fabricated using state-of-the-art molecular biology and microfluidic technologies, utilizing capillary pressure and surface-activating treatments that allow laboratory-level analytics to be conducted in an accessible manner.

This microsystem paves the way for a versatile array of clinical and academic applications that require multiple conjugations and washings. End-users of DipμChip include clinics, hospitals, homes, and assisted living healthcare facilities, democratizing access to adequate clinical care, and saving precious lives of patients in need.

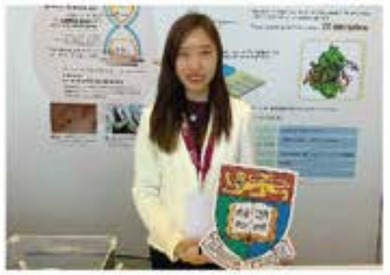
### Bronze Medal

### Aptasensor for Sepsis Diagnostic

*Prof. Julian Tanner, Dr. Louisa Lo, and Dr. William Whitehouse*

Diagnosing sepsis in a timely manner to ensure optimal patient survival with prompt treatment remains a major challenge. This invention utilizes a novel DNA-based biosensor that integrates aptamers into a point-of-care platform to advance sepsis diagnosis.

Aptamers recognize biomarkers by specifically binding to unique structures on their surface. Unlike antibody-based tools, aptamers provide multiple advantages in terms of stability, production cost, reproducibility and flexibility that can readily be integrated into various platforms, such as electrochemical platforms (quantitative device) and/or colorimetric assays (rapid test). The aptasensor provides a quick and highly sensitive solution for sepsis detection that can help revolutionize point-of-care sepsis detection.



# AWARDS ATTAINMENT

The distinguished honors of Gold and Silver Medals affirm the groundbreaking accomplishments of our Centre's research projects with the successful commercialization of scientific discoveries translated into tangible products. The project winners are now eligible to proceed to the iCAN Finals for additional opportunities to win the Finals Award(s). ABIC congratulates the teams on winning the Awards and wishes them all the best in the Finals proceedings. Stay tuned!

## ABIC is delighted to announce that three inventions from our Centre

**namely "Photonic Chipscope for Monitoring of Live Cell Activities" led by Dr. Zhiqin Chu, "Novel Dexamethasone Cocrystal" led by Dr. Aviva Chow, and "Ultrasensitive Rapid Antigen Tests" led by Prof. Anderson Ho Cheung Shum, have successfully passed the Jury's evaluation process and been awarded the Gold Medal in the Preliminaries of the 8th annual edition of International Invention Innovation Competition in Canada (iCAN 2023), proudly organized by Toronto International Society of Innovation & Advanced Skills (TISIAS).**

Remarkably, the fourth invention from ABIC, titled "An Integrated Continuous Manufacturing Platform for Fabricating Inhalable Nanoagglomerate Dry Powder as Next-Generation Respiratory Therapeutics" and led by Dr. Aviva Chow, has also been awarded the Silver Medal in the iCAN 2023 Preliminaries.

iCAN is the world-recognized prestigious event designed to acknowledge the continuous growth and improvement of globally impactful inventors. The previous 7 editions of iCAN (2016-2022) featured participants from 95 countries from all continents around the world, including North, Central and South Americas, Asia, Europe, Africa, the Middle East, and Oceania, defining the event as the true international stage for fusing worldwide creativity and innovation.

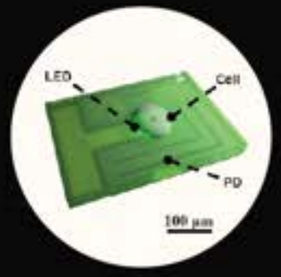

## Preliminary Gold Medals

### "Photonic Chipscope for Monitoring of Live Cell Activities"

Zhiqin Chu, Yuan Lin, Jixiang Jing, Yong Hou, Xinhao Hu, Luyao Zhang

The invention of GaN chipscope provides a low-cost and ready-to-use sensing system for label-free cellular physiological activity detection. It comprises a monolithic gallium nitride (GaN) chip as a refractometer and a mini-differential interference contrast microscopy (DIC) component for real-time capture of cellular/subcellular morphological features.

Compared to the current living cell sensing technology, the GaN-based chipscope shows a simpler setup, easier accessibility, and extremely lower manufacturing cost (<10 cents per chip), which represents a significant advancement of biosensors for drug screening, rapid disease diagnosis, and healthcare systems.




### "Novel Dexamethasone Cocrystal"

Shing Fung Chow, Kam-Hung Low, Si Nga Wong

Dexamethasone (DEX) is an anti-inflammatory glucocorticoid that displays poor aqueous solubility, hampering its therapeutic efficacy.

Cocrystal engineering has been harnessed to substantially improve the drug release of DEX in this invention through cocrystallizing with resorcinol (RES) and catechol (CAT), using mechanochemistry and controlled thermal activation.

The 1:1 DEX-RES cocrystal can be further tailored as oral/nasal inhaled powders for prospective treatments of COVID-19/allergies, with potential synergistic effects exerted by RES. The cocrystal exhibited superior aerosol performance that rivals commercial products. Our invention paves the way for new possibilities in expanding the solid-state landscape of drug molecules, revolutionizing modern drug development process.

### "Ultrasensitive Rapid Antigen Tests"

Ho Cheung Shum, Yang Cao

The invention developed a technology that can revolutionize rapid antigen tests. By selectively enriching target antigens using phase separation systems, our technology can concentrate low-concentration analytes to detectable levels, making lateral flow assays more accurate.

Our technology can detect SARS-CoV-2 N protein at low concentrations, 10 times more sensitive than commercial kits. This allows for earlier virus detection and more time for treatment. We have expanded the technology to detect other antigens like Influenza A/B N proteins. This expansion allows our optimized assays to be used for various diseases, not just influenza and COVID-19.

By broadening the range of diseases that can be detected, our technology has the potential to improve public health by facilitating early detection and treatment of infectious diseases.

## Preliminary Silver Medal

### "An Integrated Continuous Manufacturing Platform for Fabricating Inhalable Nanoagglomerate Dry Powder as Next-Generation Respiratory Therapeutics"

Shing Fung Chow, Ho Wan Chan, Hok Wai Lee

Inhalable nanoparticle-based powders for respiratory conditions have faced challenges in particle size control and manufacturing reproducibility. To address these hurdles, we developed an innovative manufacturing platform for inhalable nanoagglomerate powders by combining flash nanoprecipitation and spray drying technologies, for efficient and optimal nanoparticle delivery to the lungs by inhalation for treating various respiratory conditions, e.g., COVID-19, COPD, and lung cancer. This pioneering invention showcases a cutting-edge solution for achieving particle size customization, which possesses remarkable aerosol performance, good redispersibility, excellent stability, and promising therapeutic potential.

# AWARDS ATTAINMENT

## / The HKEST Award /

Newly introduced by the Hong Kong Academy of Engineering Sciences with the support of the Innovation and Technology Commission, the HKEST award recognizes outstanding contributions and excellent achievements among younger generations in the HKSAR throughout the arena of engineering science and technology (EST) via research, development, innovation and/or entrepreneurship.

Prof. Anderson Shum received the HKEST Award on 3 June 2023.

## / DreamOn the HKU Innovation & Entrepreneurship Day /

On 6 June 2023, Dr. Nan Lang and Mr. Nicky Lee, ABIC members, attended DreamOn, the HKU Innovation & Entrepreneurship Day, and received HKU DeepTech100 Award.

Prof. Anderson Shum moderated the panel discussion: "Venturing for Good", to discover stories about how the next generation of HKU entrepreneurs transformed ideas into action and dreams into reality.


(HSRP WORKSHOP)

# YASHK STUDENT VISIT

**On 18 July 2023, the Hong Kong Young Academy of Sciences (YASHK) launched its laboratory visit under the "How to Start a Research Project" (HSRP) workshop, bringing over 30 secondary students to explore the Advanced Biomedical Instrumentation Centre (ABIC).**


The objectives of the HSRP workshop are to educate secondary students with practical research project initiation techniques and to enhance their analytical, planning, organizing, and presentation capabilities. The HSRP workshop coordinates extensive outreach activities, such as scientist exchanges, laboratory visits, competitions, etc.

Prof. Anderson Ho Cheung SHUM, Director of ABIC and President of YASHK, has continued supporting the HSRP workshop by serving as their speaker of sharing sessions, public lectures, and forums. knowledge of cutting-edge equipment and the latest R&D trends in the biomedical engineering field. During the YASHK lab visit, Prof. Shum explained to the students that the mission of ABIC is to accelerate the translation progress of advanced biomedical instrumentation from research and development (R&D) into tangible healthcare solutions that benefit the world.

Professor Shum also described the five cross-field characteristics of ABIC, namely cross-disciplinary, cross-regional, cross-generational, cross-institutional, and cross-phase collaborations.

Our Centre researchers, Dr. Johnny Wong and Mr. Zou Tao, have also guided the students through the fabrication laboratory and cell culture laboratory, shaping their hands-on exposure to the realistic scientific research environment, and instilling students with the knowledge of cutting-edge equipment and the latest R&D trends in the biomedical engineering field.

# INTERNATIONAL EXHIBITIONS

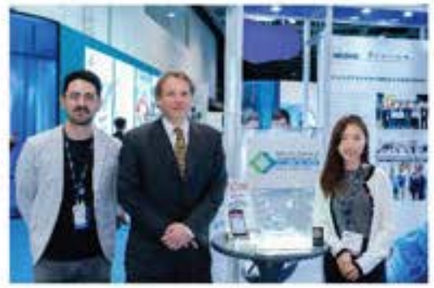
ASIA SUMMIT ON GLOBAL HEALTH
亞洲醫療健康高峰論壇

## ASIA SUMMIT ON GLOBAL HEALTH 2023

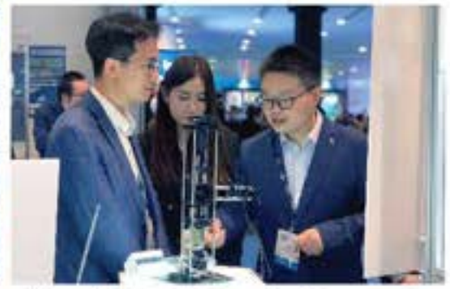
**ABIC hosted an exhibition booth at the "Asia Summit on Global Health" launched on 17 May 2023, grasping the excellent opportunity to engage in face-to-face networking and community building with international investors, academics and experts from biomedical and diversified sectors.**

Three project initiatives from ABIC were highlighted at the Summit, shedding light as tangible steps to catalyze significant impacts in global health movements. Project briefs are listed as follows:

"DipμChip – Capillary Microfluidic Platform for Point-of-care Diagnostics" from the research group led by Prof. Anderson Shum



"Aptasensor for Sepsis Diagnostic" from the research group led by Prof. Julian Tanner



"Monolithic GaN Photonic Chipscope for Label-Free Monitoring of Live Cell Activities" from the research group led by Dr. Zhiqin Chu


**The project initiatives demonstrate ABIC's dedication to advancing global health with positive impacts worldwide.**

## ABIC extends gratitude to all researchers involved with ground-breaking endeavors.