

大学院教育支援機構（DoGS）海外渡航助成金 報告書

Outcome report

計画名 Plan	第 29 回 MicroTAS 国際学会への現地参加と研究成果発表
氏名 Name	YANG, Meixuan (やん めいしえん)
研究科・専攻・学年 Graduate school/Division/Year level	工学研究科マイクロエンジニアリング専攻博士後期課程 1 年生
渡航国 Country	オーストラリア、アデレード
渡航日程 Travel schedule	2025 年 11 月 1 日 ~ 2025 年 11 月 8 日

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渡航計画の概要 Outline of the travel plan

I participated in the 29th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2025), held from 2–6 November 2025 in Adelaide, Australia. MicroTAS is the premier international forum for presenting research advances in microfluidics, lab-on-a-chip, organ-on-a-chip, wearables, BioMEMS, microfabrication, 3D printing, nanotechnology, materials and surface engineering, chemical analysis, biosensing, and their applications in life sciences, medicine, the environment, agriculture, energy, and food science.

The central tenet of MicroTAS is an outstanding technical program selected from contributed abstracts. A total of 776 presentations were accepted, including 105 oral presentations and 671 posters. The poster sessions, held as dynamic two-hour events over three consecutive days, are considered the heart of the conference and offer rich opportunities for scientific discussion, brainstorming, and networking. Notably, MicroTAS 2025 introduced industry-led technical talks for the first time in its academic program, providing insights into how innovative microfluidic and microphysiological technologies are being translated toward real-world impact. These sessions also highlighted the growing industrial interest in microphysiological systems (MPS).

Based on my observations, the conference attracted a well-balanced representation of participants from Europe, North America, Southeast Asia, and other Asian regions. This diversity enabled me to interact with researchers and students from many different countries and universities, giving me the opportunity to experience a variety of research atmospheres and academic cultures. Through these exchanges, I improved my ability to present and discuss research in English and gained a clearer sense of how well I can adapt to research environments outside of Japan. Overall, it was a meaningful and valuable experience for my academic development.

Each day featured approximately 30–40 oral presentations and over 200 posters, organized into 13 thematic categories, reflecting the high density and diversity of scientific content. A significant portion of both oral and poster presentations focused on organ-on-a-chip and microphysiological system (MPS) technologies, which made the schedule very busy but highly engaging. During the poster sessions, I had the opportunity to interact with numerous researchers and students working on blood–brain barrier (BBB) models, including both animal-based and MPS-based approaches. These discussions provided valuable insights directly

relevant to my own research and allowed me to gain a wealth of practical experience.

I presented a poster titled “Establishment of an iPSC-derived Blood-Brain Barrier (BBB) Model for Investigation of Dengue Virus (DENV) Infection.” The study focused on the construction of a BBB-MPS model and the subsequent investigation of DENV infection using this model. In this model, three cell types were co-cultured to simulate the blood–brain barrier in vitro: iPSC-derived brain microvascular endothelial-like cells (iBMELCs), human brain microvascular pericytes (HBMVPCs), and human astrocytes (HAs). The integrity of the barrier was confirmed through immunostaining and permeability assays. Following model establishment, DENV infection experiments were conducted. We examined viral replication within the BBB model, induction of the cytokine MMP-9, and the effects of viral infection on immune-related gene expression. The results showed that DENV efficiently infected iBMELCs and induced upregulation of antiviral genes, but did not directly compromise the barrier’s tightness, and no infection was observed in HBMVPCs or HAs under the current conditions. These findings demonstrate the utility of this BBB-MPS model for studying the mechanisms of DENV infection and provide a foundation for future experiments to further explore and expand its applications in understanding DENV–BBB interactions.

The conference attracted not only students and researchers working on MPS-related topics, but also participants from other fields, allowing for meaningful discussions and exchanges across diverse research areas. Through these interactions, I gained many new insights and perspectives, which helped me reflect on challenges in my current research and consider ways to improve, optimize, and expand my work in the future.

Adelaide is a beautiful city, and the conference venue, the Adelaide Convention Centre (Fig. 1), has been awarded Master status by EarthCheck in recognition of 15 years of sustainability achievements. The city features distinctive architecture and a rich natural environment. The



Fig. 1 Conference venue: the Adelaide Convention Centre, Adelaide, Australia. In the lower right corner: lunch at the venue, featuring kangaroo meat.



Fig. 2 Conference banquet held at the International Rose Garden and National Rose Trial Garden, Adelaide Botanic Garden, Adelaide, Australia.

conference banquet (Fig. 2) was held within the Adelaide Botanic Garden, providing a lively and enjoyable atmosphere where attendees from different countries could relax and connect. Adelaide's natural beauty is also reflected in the harmonious coexistence of humans and wildlife. During our visit to Cleland Wildlife Park, we had the opportunity to see koalas, kangaroos, and emus up close and experience the local wildlife firsthand, which was a truly memorable experience.

Attending MicroTAS 2025 in Adelaide provided me with extensive academic exchanges and new insights, broadening my understanding of research in the field of microphysiological systems (MPS) and highlighting the growing industrial interest and wide-ranging future applications of MPS technologies. I had the opportunity to meet and engage in meaningful discussions with researchers and students from many different countries, which not only improved my English communication skills but also allowed me to make valuable professional connections. In addition, I was able to experience Adelaide's beautiful cultural and natural environment firsthand.

Overall, this conference was highly beneficial, giving me a clearer perspective on the global context of my research and helping me reflect on how to further advance my studies to achieve new results and insights. I am deeply grateful to the Grant for Overseas Research by the Division of Graduate Studies (DoGS) for supporting my participation in this conference.

成果 Outcome

During the conference, I had in-depth discussions and exchanges with researchers and students from various fields, which provided me with new insights. I was able to interact with other researchers working on different approaches to constructing BBB models, discussing challenges

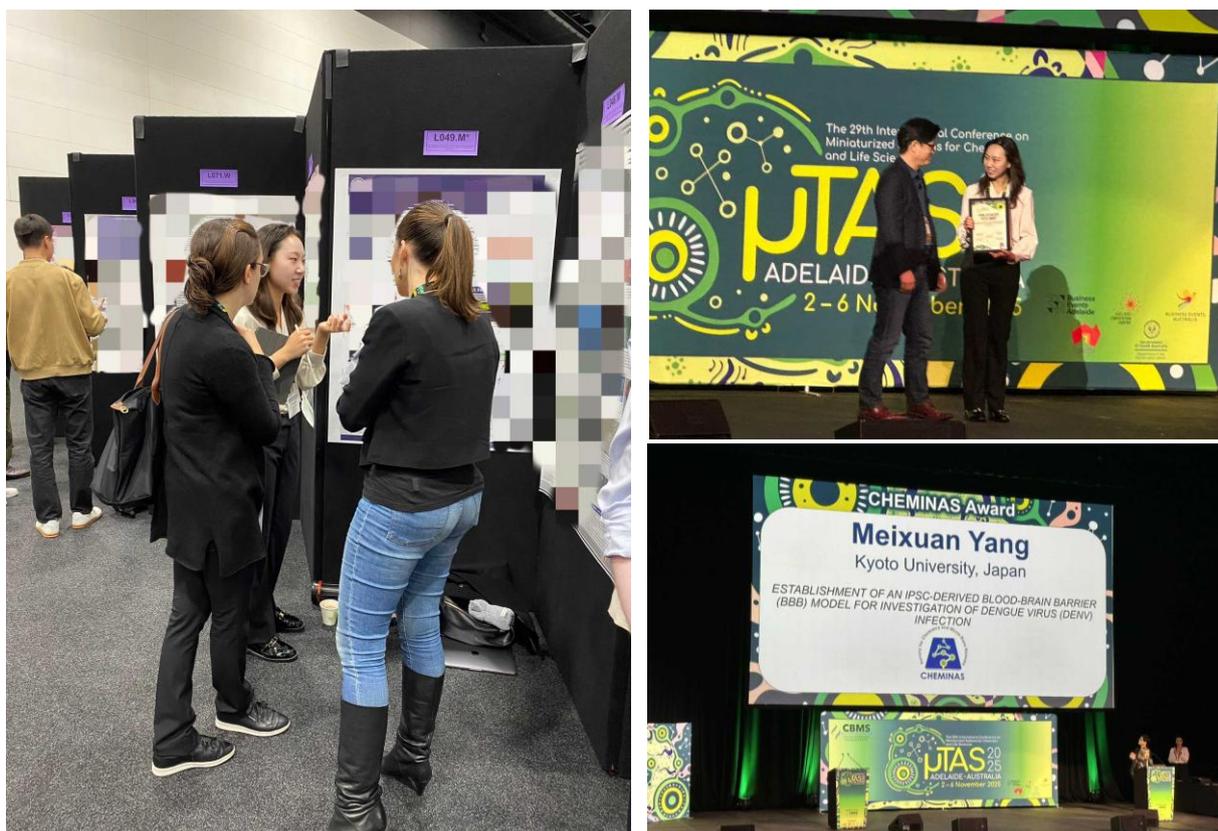


Fig. 3 Left: during my poster presentation. Right: receiving the Young Researcher Poster Award.

encountered in model development and possible solutions.

Regarding my poster presentation, I was pleased to see that many attendees took a genuine interest in my work and that the key points I intended to communicate were accurately conveyed. I particularly felt the appeal and significance of my research, which combines my background in microfabrication with the design of a device capable of quantitatively evaluating viral infection across the blood–brain barrier. By clearly demonstrating the strengths, versatility, and importance of this device, my work was recognized and awarded the **Young Researcher Poster Award** (Fig. 3) (with only three awardees out of 671 posters presented, representing about **0.45%**). This award, announced by the MicroTAS Conference and sponsored by the Society for Chemistry and Micro-Nano Systems (CHEMINAS), recognizes outstanding poster presentations, with a select panel of judges evaluating the best posters from each session.

Recognition of my research at the premier international forum for MPS affirmed the global relevance and applicability of my work. Additionally, receiving this award at an international conference strengthened my confidence in my ability to effectively communicate and present scientific research in English, demonstrating that these skills are recognized and valued in a worldwide context.

今後の展望 **Prospects for the future**

Attending this international conference on MPS allowed me to directly experience the enthusiasm and impact of research in this field on biology and medicine. It also provided valuable insight into current trends and potential future directions for MPS-related studies. Participation in this conference offered an important opportunity to reflect on the motivation behind my own research and to consider its future directions.

In the near future, I plan to disseminate the findings from my poster presentation more broadly, for example through publications, to share my BBB-MPS model and DENV infection results with the global research community. I also aim to further optimize and expand this model, incorporating feedback and perspectives gained from international researchers to address remaining challenges and explore new applications.

Engaging with researchers and students from around the world has provided me with valuable ideas for future experiments and collaborations, as well as guidance on how to approach my research questions from different angles. These experiences will help me refine my methodology, design more comprehensive studies, and contribute to advancing the understanding of DENV infection mechanisms and MPS applications.

Finally, I would like to sincerely thank the Grant for Overseas Research by the Division of Graduate Studies (DoGS) for supporting my participation in this conference, which has been invaluable for shaping my future research plans and international engagement.