

CCEB NEWS

A NEWSLETTER OF THE SCHOOL OF CHEMISTRY, CHEMICAL ENGINEERING AND BIOTECHNOLOGY



MESSAGE FROM OUR ACTING CHAIR

Dear CCEB Community and friends,

I am delighted to welcome you to the very first issue of the CCEB Newsletter. As the first interdisciplinary school in the College of Engineering and College of Science in NTU, the School of Chemistry, Chemical Engineering, and Biotechnology (CCEB) celebrated its successful inauguration on 8 August 2022 and official opening ceremony by Second Minister for Education, Dr Maliki Osman on 26 August 2022.

I am pleased to share with you the School's achievements and successes, and keep you informed about our vibrant interdisciplinary community in this newsletter.

In this inaugural issue, we will explore:

WHAT'S INSIDE:

- Unveiling the world's first RNA-based scar prevention microneedle patch
- FormaCyte's recent achievement
- ProVeg Food Innovation Challenge APAC 2022
- Champion Team - Allianz Consulting Case Competition 2022
- Rising to the top
- Student Entrepreneur
- Event Highlights

- Ground-breaking Research: Discover the CCEB's recent achievement in developing the world's first RNA-based scar prevention microneedle patch, which has the potential to revolutionise wound healing and scar prevention in the medical field.

This revolutionary product is a successful outcome of a joint research collaboration between Associate Professor Timothy Tan of CCEB and Associate Professor Tey Hong Liang of National Skin Centre. You may find out more about this product using the following link: <https://www.rnascence.com/>



- **Team Formacyte's Success:** Learn about the accomplishments of Team Formacyte, led by Assistant Professor Dang Thy Tram, who earned prestigious accolades at both the China-ASEAN Innovation and Entrepreneurship Competition 2022 and the Prototype for Humanity showcase.
- **Rising Stars in Science:** Get to know two of our distinguished alumni, Dr Bi Renzhe (CCEB/2015), an inspiring figure in STEM Research, and Dr Koh Joo Ming (CCEB/2012), a trailblazer in organic chemistry, who have both been recognised as National Young Scientist Award winners.
- **How our postgraduate and undergraduate students triumphed in Challenges/ Competitions in recent months and brought NTU glory.**
- **Event Highlights:** Take a look back at some of the memorable events that took place over the past few months, including Meet-Your-Mentor Session, Annual Beer Brewing Competition, Avogadro's Day, CCEB @ NTU Open House 2023, as well as other events organised by our CCEB Club and CCEB Alumni Association.
- **Student Entrepreneur Spotlight:** Be inspired by the entrepreneurial spirit of our CCEB students as we showcase their innovative ideas and ventures.

Over the past 8 months, the School had witnessed remarkable achievements by our students, faculty, and alumni. My colleagues and I are truly grateful for the support and encouragement we have received since our inauguration. I hope you will enjoy this first issue and take pride in the incredible accomplishments of CCEB. I encourage you to share these stories and stay engaged with CCEB, as the School continues to grow and excel in our interdisciplinary pursuits.

CCEB also welcomes your feedback and suggestions for future issues, so please do not hesitate to reach out to us at CCEB-StudentOffice@ntu.edu.sg. Together, we can make the CCEB Newsletter a valuable resource for our entire community.

Warm regards,

Professor Chiba Shunsuke

Acting Chair

School of Chemistry, Chemical Engineering and Biotechnology



RESEARCH HIGHLIGHTS

Unveiling the world's first RNA-based scar prevention microneedle patch

By Chan Wen Kiat

Associate Professor Timothy Tan from the School of Chemistry, Chemical Engineering and Biotechnology at NTU in collaboration with Associate Professor Tey Hong Liang, Co-Director of the Skin Diseases Programme at the National Skin Centre, Singapore, have developed the world's first activated-siRNA dissolving microneedle patch for pathological scars such as hypertrophic scars and keloids.

Gene silencing RNA (siRNA) is a potent candidate for preventing and treating diseases that currently do not have good therapies or are undruggable using conventional drugs. Through silencing specific gene expressions, the overproduction of certain proteins linked to diseases can be significantly reduced, thus treating the diseases. An overview of the RNA interference (RNAi) process is outlined in Figure 1. However, siRNA is unstable and is easily degraded by RNases found naturally in bodily fluids.

Overcoming the problems of siRNAs stability, Professor Timothy Tan and his team successfully developed siRNA nanoplexes using a proprietary platform technology to protect and deliver siRNA. By embedding the siRNA nanoplex into dissolving hyaluronic acid microneedle tips, this technology allows painless transdermal delivery, overcoming the skin barrier and achieving cell targeting and gene silencing (Figure 2).

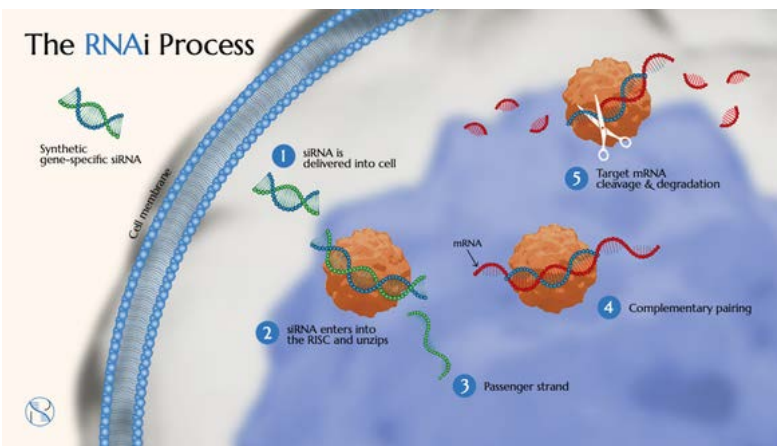


Figure 1: Overview of the RNAi Process

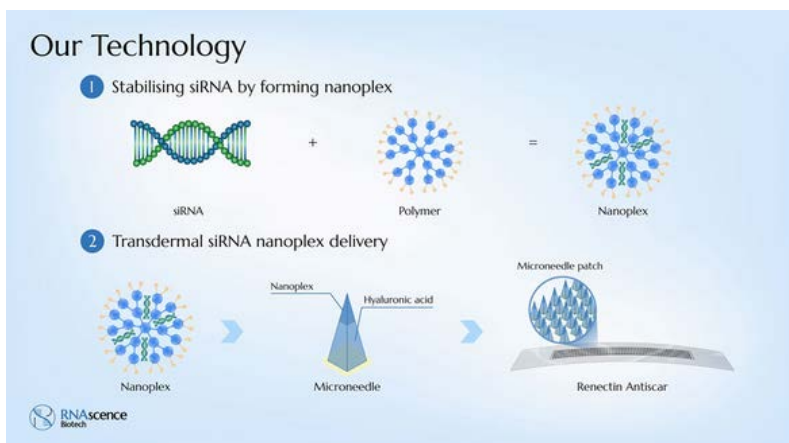


Figure 2: Schematic showing the RNA nanoplex which stabilizes the siRNA followed by its loading into dissolving microneedle tips for transdermal delivery

For pathological scar treatment, gene silencing siRNA targeting collagen production is used to prevent over-accumulation of collagen and scar formation. The proprietary siRNA nanoplex also consists of a specific motif to target skin fibroblasts, which are the main cells in the skin that produce collagen.



Figure 3: The RNAscence Biotech team converged at the Art and Science of Medicine Festival 2023 hosted by LKCMedicine@HDB Hub. From left to right: Diana Chor (General Manager), Dr. Chun Yong Yao (co-founder & co-inventor), Assoc. Prof. Tey Hong Liang (co-inventor), Assoc. Prof. Timothy Tan (co-founder & co-inventor), Chan Wen Kiat (co-founder & CEO), and Jyotsna Ramakrishna (Year 2 LKCMedicine Student Ambassador).

ACHIEVEMENTS

FormaCyte's recent achievement

By Dr Chen Yang



FormaCyte at semi-final



Prof Dang representing FormaCyte pitched at semi-final

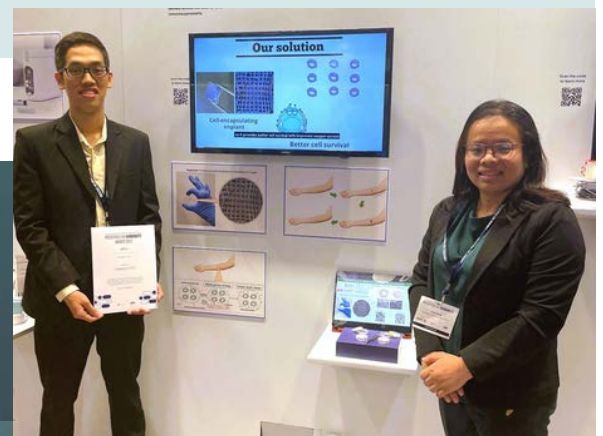
The China-ASEAN Innovation and Entrepreneurship Competition 2022 consisted of three rounds of selection. Since the launch of the competition in August 2022, a total of 71 groups from ASEAN Member States and China were selected for the semi-finals. After intense competition in the semi-final round, 20 teams (10 in the enterprise group and 10 in the team group) competed for the final crown. For team group, there is one first prize, 3 second prizes and 6 third prizes.

FormaCyte was awarded with one of the second prize with 20,000 RMB bonus in the finals under team group.

More information can be found in this link: <https://asean.org/china-asean-innovation-and-entrepreneurship-competition-2022-winners-announced/>

Furthermore, FormaCyte was the winner of health category in the Prototype for Humanity showcase against top 100 global teams in late 2022.

Please refer to this link for further information: <https://www.prototypesforhumanity.com/academic-awards/>



PROTOTYPES FOR HUMANITY 2022 WINNERS



CHI PHAM



CHEN YANG



NAM TRAN

NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

HEALTH

FormaCyte, a revolutionary Implant for type 1 diabetes management.
By Nam Tran, Chi Pham and Chen Yang,
Nanyang Technological University, Singapore.

ProVeg Food Innovation Challenge APAC 2022

By Yeo Ying Tong

In response to the global transition towards plant-rich sustainable living, ProVeg International launched the inaugural Food Innovation Challenge to raise awareness of benefits of plant-based eating, accelerate the introduction of plant-based foods and nurture innovation. In 2022, ProVeg partnered with major food companies Unilever, Pepsico, Omnifoods, Beyond Meat, Oatly and CPF for the challenge. Together, they drew in more than 500 students from across the Asia-Pacific (APAC) region, resulting in 179 idea submissions across 163 universities. Only a total of 20 finalists were chosen, sharing a total of USD 11,800 in prizes.

Among these finalists were our PhD CBE students, Yeo Ying Tong and Liang Jiaqi. Along with two other students from NUS, their team “The Slouch Pouch” impressed judges with an innovative, ready-to-eat convenient food pouch product using Unilever’s The Vegetarian Butcher line. They emerged as one of the top 20 teams and was among the five teams selected to present virtually at the UN Climate Change Conference COP27 – Food4Climate in Cairo, Egypt on 10 November 2022. “The Slouch Pouch” and the other finalists are proof that a plant-based diet is not only sustainable but also delicious and exciting, and this is a step towards a more sustainable future with these young innovators leading the way.



First row, left to right: Tan Hui Ru (NUS), Liang Jiaqi (NTU);
Second row, left to right: Andrea Koo (NUS), Yeo Ying Tong (NTU)

Champion Team - Allianz Consulting Case Competition 2022



Shubh Sethi presenting at the Competition

As part of the multi-disciplinary team of 4 students from different backgrounds and degrees, our CBE student, Shubh Sethi, participated in the Allianz Consulting Case Competition 2022, a competition related to the Insurance industry in Malaysia. 204 participants from all around Singapore universities such as NTU, NUS, SMU Yale-NUS (52 teams) took part in this competition which was held in September 2022.

The team evaluated the feasibility of a joint venture in the insurance market, considering strategic and financial synergies along with potential risks and proposed a two-pronged approach coupled with a four-layered filter to scan insurers in Malaysia to identify an optimal partner.

After going through one qualifying round before the final presentation in front of senior leaders of Allianz Consulting, the team stood as the winners of the competition which lasted 2 months and was awarded a cash prize of S\$500.



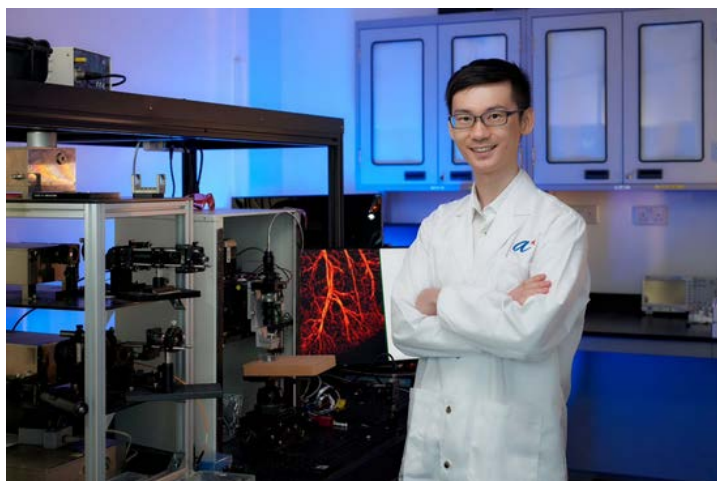
At the Award ceremony, with the judges

ALUMNI

Rising to the top

What does it take to be recognised as a top young scientist? Two NTU alumni under 35 who bagged the national Young Scientist Award reflect on their STEM careers

By Nur Isyana Isaman



Dr Bi Renzhe in his lab, where he works on award-winning innovations (Credit: A*STAR)

Many researchers spend a lot of their time working in the lab, but not for Dr Bi Renzhe (CCEB/2015). Beyond lab work, he enjoys taking time to interact with the people impacted by his research. By doing that, he gets a better understanding of how his work can make a difference to society.

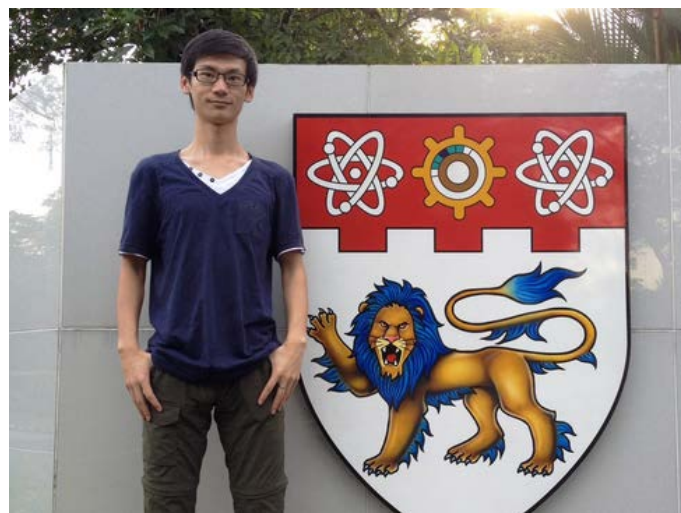
“We work closely with healthcare stakeholders to optimise our prototypes and perform clinical trials to validate our hypothesis. I take every opportunity to talk to them. Even when I send my daughter to pre-school, I discuss collaboration opportunities with a fellow parent, who is a clinical scientist,” he shared.

Currently a senior scientist at A*STAR, Dr Bi develops new technologies and devices that use laser-based imaging to diagnose diseases which are useful in quantitative eczema assessment and skincare product validation.

Dr Bi’s interest in research stemmed in high school, where he was inspired by a scientist’s talk. He specialised in biomedical optics for his undergraduate studies and by the second year, he knew that he wanted to pursue a PhD. He completed his PhD at NTU School of Chemical and Biochemical Engineering (now known as CCEB).

Through his work, Dr Bi has achieved three granted patents. In recognition of his efforts, Dr Bi has been honoured with the Young Scientist Award in December 2022.

“It takes about three to four years for one patent to be granted and I own three, which have been licensed or assigned to medical technology companies. I am heartened to know that my inventions have significant societal and industrial values, which motivates me to bring research and technology from the lab closer to people’s lives,” said Dr Bi.



Dr Bi pursued his PhD at NTU School of Chemical and Biochemical Engineering (now known as CCEB)

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However, success does not come easy. He explained, “The mundane aspect of my work is debugging hardware and software, which can be tedious and time-consuming when we cannot identify what causes the problem. There were times when I contemplated giving up my career in STEM research. But to see my work making a true impact is worth all the pressure.”

A role model for the next gen



Dr Koh Ming Joo is deeply passionate about organic chemistry research (Credit: A*STAR)

The other recipient of Young Scientist Award is also an NTU alumnus, Dr Koh Joo Ming (CCEB/2012), who was recognised for his research in sustainable technologies that boost chemical production efficiency.

One of Dr Koh’s discoveries even received the attention of the American Chemical Society’s Chemical & Engineering News (C&EN), and he has become the first Singaporean to win the prestigious Talented 12 Class of 2022 award from them. He also co-owns several patents including those licensed by Swiss-based company XiMo AG.

Right after his NTU convocation where he received first class honours in chemistry, Dr Koh flew to Boston to embark on his PhD journey. However, upon reaching, reality smacked him just like the snowstorm there.

“I had never travelled so far away. A different weather. A different culture. It was challenging to survive and thrive. It took me two years to get used to the changes. I spent about six years away from home, working at least 10 hours a day, six days a week to earn my PhD in organic chemistry,” recounted Dr Koh.

But his passion kept him going. “In the initial years of setting up my research group and securing funding, I was unsuccessful in many fellowship and grant applications. Those disappointments gave me extra motivation to improve my proposals and develop better ideas to solve challenging problems in chemical synthesis,” he said. Today, the 35-year-old works as a President’s Assistant Professor at NUS.

Dr Koh credits his strong passion in organic chemistry to his professors at NTU.

“Professor Loh Teck Peng was among the first few people who inspired me to go into organic chemistry. During my time at the chemistry division, I worked with Professor Philip Chan for several years, including a final year project. These professors and others at NTU encouraged and supported me,” shared Dr Koh.



“Organic chemistry is in every part of our lives; humans are made of organic molecules and we eat foods that contain organic molecules. It’s a research field that has major implications for the entire chemical industry, especially as the world moves towards sustainability. Developing sustainable solutions will transform the industry for future generations,” he added.

Now, it’s his turn to support the next generation of researchers. In his role, Dr Koh nurtures talented students, some of whom have won best student researcher awards and established successful careers.

Dr Koh (first from left) back when he was doing lab work at NTU

“Be resourceful and willing to learn new things and accept failures along the journey because they will eventually lead to success,” this is his constant reminder to budding researchers and himself as they continue to produce purposeful work with real-life applications beyond academic publications.

As for Dr Bi, he believes that his journey will continue to be tough yet rewarding. His advice to young researchers is something he would have told his younger self, “Everything that you are afraid of and worried about now, you will overcome it and become stronger thereafter. Don’t doubt yourself and continue to persevere in this field.”

These awards are administered by the Singapore National Academy of Science and supported by the Agency for Science, Technology and Research (A*STAR).

This article was originally published on 16 Mar 2023 on NTU website

STUDENT ENTREPRENEUR

Nila Ravichandran, co-founder of Dawn Cups



Nila Ravichandran, cofounder of Dawn Cups

Meet Nila Ravichandran, our final year Chemical & Biomolecular Engineering student, who co-founded Dawn Cups, a company that offers women hassle-free period experience, prioritises the health of women and offers an eco-friendly sanitary product.



Tell us more about yourself

I am a final year international student studying chemical & biomolecular engineering at NTU. I came across the Minor in Entrepreneurship (MiE) programme through emails sent via Nanyang Technopreneurship Centre (NTC) and it seemed to be an exciting programme. I had no prior entrepreneurship experience so I decided to join the program and discover my creative mindset in the world of business.



Tell us more about your start-up company

Dawn Cups is a student-led venture that offers sustainable menstrual cups and aims to empower young women in Singapore. We ACRA-registered Dawn Cups as an LLP in October 2021. In the following months we sourced for suppliers to finalise the menstrual cup manufacturer, purchased the satin drawstring pouches overseas, developed a website, soft-launched on Instagram, conducted our own product photoshoot and officially launched in February 2022.

In order to extend our outreach to NTU students and spread awareness on our product within the student community, we had two collaborations:

i) Saraca Store -

This was a collaborative effort that I led with NTU Saraca Hall to gain recognition as a business, expand outreach within the NTU Community and generate sales from the physical store. An exclusive discount was offered for purchases made by students. From this, 3 organic sales and 10 Instagram followers were achieved.

ii) A Better Flow -

A menstrual cup campaign by an FYP team from Wee Kim Wee School of Communications in NTU. We had Instagram stories and posts and a booth feature of Dawn Cups.

③ What is your vision and mission for this company?

Through Dawn Cups, we hope to empower women to learn more about their own bodies, help them make their periods more tolerable, and develop a supportive community where we can tackle the stigma surrounding periods together.

Our motto is “Simple. Safe. Sustainable” because we provide a hassle-free period experience, prioritise the health of women and offer an eco-friendly sanitary product.



Figure 1: Dawn Cup

④ What is your vision and mission for this company?

It can be difficult for women in Singapore to find environmentally sustainable alternatives to menstrual pads due to lack of education and awareness on menstrual products other than pads and tampons. There is also a gap in the market for sustainable and inexpensive options in Singapore. That was our motivation to start a menstrual cup business.

⑤ What are the challenges you face in this start-up company?

As this was the first time any of the cofounders and I were starting a business, we spent a lot of time researching on finding the best menstrual cup manufacturer. This delayed our sourcing of the additional packaging and drawstring pouches that we provide with the cup. Unfortunately, due to the festive period from December 2021 until February 2022 (i.e. Christmas, New Year, CNY), we could place our order for the drawstring pouches online as they would not arrive in time for our official launch in February 2022.

I had gone back to India to meet my family for vacation in December. Due to the delay in pouch delivery, I locally sourced drawstring pouches in India and it ended up working in our favour. I was able to negotiate the price and lower the minimum order quantity (MOC) by speaking in Hindi with the supplier. The supplier was very interactive and provided premium quality satin to customise our drawstring pouch perfectly. We then used international shipping from India to Singapore via DHL, which saved a total of \$400 for 200 pouches in comparison to the cotton pouches from the supplier based in China.

6 Tell us more about the menstrual cups your company is producing? How does it benefit women? How does it benefit the environment? How sustainable is it?

A Menstrual Cup is a small, flexible and reusable cup that is made of 100% medical-grade silicone and is used in-vitro to collect menstrual blood, rather than absorbing it. Our menstrual cups are sourced from a reliable manufacturer in USA, is FDA registered and has worked with other menstrual cup brands outside of Asia. We opted for the smallest size to target the young Asian market that is not familiar with the product.

With proper care, a single menstrual cup can last up to 10 years. It can be used for 8-10 hours before needing to be changed, which is less demanding than pads and tampons. It is 100% leakproof and provides a clean, dry period experience. Most importantly, it is safer than pads/tampons in that does. Not contain any additives, bleaching agents or carcinogens.

7 Did you get any help from NTU and/or other parties? In what way did they help you?

This business was started as part of the Minor in Entrepreneurship (MiE) Program in NTU, so naturally the instructors guided the initiative and were available for consulting and advice on tricky situations, especially in the beginning. However, the business has always been self-funded i.e. from the other cofounders and I.

8 What is your advice to other students, especially to your peers/juniors in pursuing their dreams?

I would encourage other students to participate in events or programs, even if they do not have prior experience in the subject. There is no better way of discovering your interests than engaging in a program that you do not know much about.

It may either completely change your pathway in life or, at the very least, diversify your skillset that may help your career aspirations at some point.

9 Anything else you would like to add?

We currently have our business on hold to further improve packaging and extend our brand outreach. We are always improving and would love to hear from our customers.

If you are interested in purchasing a Dawn Cup or expressing anything you would like to see different in our menstrual cup brand, please fill up this interest form: <https://forms.gle/pKkjaQsecK7Amzft6>



Figure 2: Satin Drawstring Pouch

EVENT HIGHLIGHTS

MEET-YOUR-MENTOR SESSION



MEET YOUR MENTOR SESSION was held on 19 January 2023 at CCEB, Nanyang Drive. The event was attended by about 70 CCEB year 1 students and faculty members, while enjoying their lunch.



This was the inaugural event held since the integration of the Division of Chemistry and Biological Chemistry from the School of Physical and Mathematical Sciences with the School of Chemical and Biomedical Engineering. The event was organised to help freshmen to get to know their Mentor better, be informed about NTU matters, adapt better to their undergraduate life and to get help in choosing appropriate courses of study and career options.

ANNUAL BEER BREWING COMPETITION

By Sia Ming Jie

On 2 February 2023, Zymurgy Guild hosted the annual beer brewing competition. A total of 5 teams - 25 people competed to make their unique brew. The theme of this year's competition was to make an IPA with a tropical twist. To let their creativity shine, participants were encouraged to incorporate tropical flavours through addition of fruits or fruit extract, and also print their own labels, and include pairings to make their beers stand out.

Guest judges were invited to grace the event and to mingle with the students, and among them was Mr Hirose, the owner of SGTaps, and Daryl, a past Beer Brewing Competition winner. The prizes for the competition included beers and vouchers for taprooms for our young and brilliant minds to explore the world of craft beer.



AVOGADRO'S DAY



About 250 CCEB students took part in Avogadro's Day, a virtual amazing race organised by CCEB Club, which was held on 6 February 2023, from 2-7pm.

It was a fun-filled event where students participated in a series of challenges, by scanning the QR codes to access the station games around NTU, which included CCEB Building, SPMS Building and North Spine Walkways.

Some lucky students walked away with attractive prizes! Coffee and avocado toast were catered at both SPMS MAS Atrium and CBE-LT for those who participated and filled up the survey.



An Amazing Race!

2-7 PM

North Spine

SPMS Building

CCEB Building

Grab your Coffe and Avocado Toast from 2-4 PM



NTU CCEB Club Presents

Avogradro Day



6 FEBRUARY 2023

Amazing Prizes!



PRISM+ MONITOR



NINTENDO SWITCH



LUMOS P



KEYCHRON K6

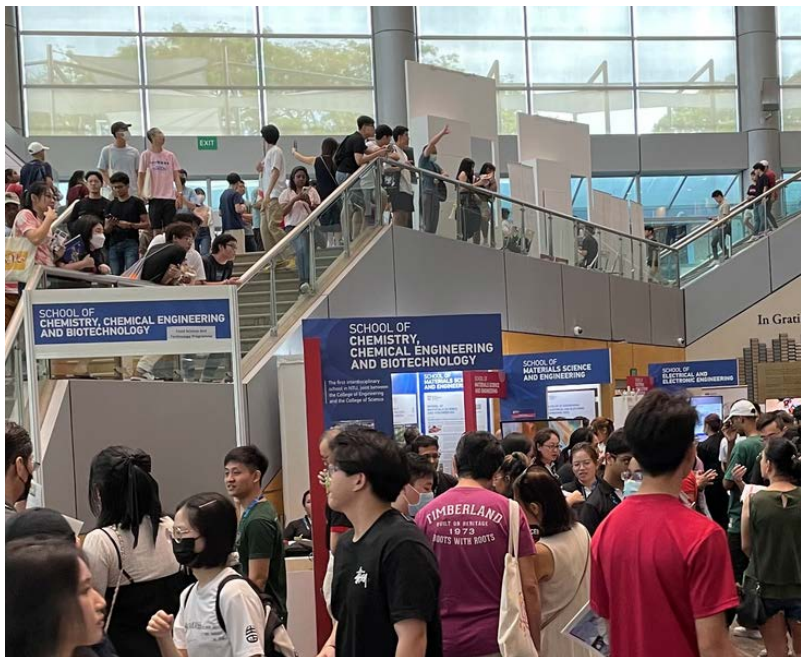


JBL CLIP 4



CAPITALANI

CCEB @ NTU OPEN HOUSE



NTU held its Open House in February this year. Besides showcasing its broad, diverse programmes and providing immersive experience of NTU Smart Campus, the event aimed to position NTU as a young and vibrant university.

CCEB participated in this year's NTU Open House. The virtual Open House was held on 11 February and the physical one on 25 February 2023. The focus of the virtual session was on information sharing via live presentations and live chat, whereas the physical one was experiential & immersive, where we showcased our labs/projects, gave talks and mock lectures and in-person consultations to visitors, which are mainly students and their parents. Being part of both College of Engineering and College of Science, we set up our booths at Nanyang Auditorium and at the lobby of the School of Biological Science.

Through the event, we hope the students can make an informed decision on their next level of education.

NTU. It all starts here.



Some of the activities during the Open House 2023

CCEB INTRA-CLAN ACTIVITIES

By Ryan Tan

To mark the end of midterms of the semester, the CCEB club organised intra-clan bonding activities during recess week for students to take a breather from school through bonding with their fellow clan members. The purpose of the event was to provide fun and engaging experiences for students, as well as opportunities to socialise and forge bonds with their peers.

We also hoped to ignite the spirit of friendship and togetherness among the CCEB community through these intra-clan activities.

The CCEB club facilitated a discussion among the 6 clan heads and their members to determine the types of activities they would like to participate in. With the club's support, these events were successfully organized and carried out.



Kanza clan Barbeque (24 Feb 2023)



AthenaxOmaha clan Back-2-School event (6 Mar 2023)



Titowan clan Recreational Games session (3 Mar 2023)



Hushnom clan bowling at SAFRA Yishun (2 Mar 2023)

Attractive prizes such as Starbucks vouchers and electronic appliances (e.g., cordless vacuum, Bluetooth karaoke microphone, etc.) were given out within some of the clans. One highlight of this event was the merger of Athena and Omaha's activity, a Back-2-School event which garnered a sizeable turnout. The students enjoyed a myriad of carnival games and carnival-style prizes.

The intra-clan activities were well-received by the students, who gave feedback that the activities were engaging and creative. The prizes were also noted to be enticing to the participants.

The 1st CCEB club would like to thank the clan heads and students for making this event possible!

CCEB Alumni Association Sundown Movie Night

CCEB Alumni Association organised an outdoor movie screening for its alumni at Cinewav, Marina @Keppel Bay in the evening of 3 March 2023.

Showing a movie called "Jimami Tofu", it was a great event for the CCEB alumni to meet and catch up with each other after so long.

The sky cleared up just for that few hours when they had their movie screening. It was the perfect weather for watching a movie outdoor, and we believe our alumni enjoyed themselves too!

Sharing with you some pictures that were taken on the day.

