

HKCTC SPECIAL AWARD FOR OUTSTANDING PROJECT IN TESTING 2022

SCIENCE COMPETITION INSPIRES STUDENTS TO UNDERSTAND TESTING AND CERTIFICATION

Testing and certification are essential to ensure the safety and quality of products and services, thereby safeguarding consumer interests. To raise students' awareness and interest in testing, the Hong Kong Council for Testing and Certification (HKCTC) has cooperated with the Hong Kong New Generation Cultural Association to co-organise the "HKCTC Special Award for Outstanding Project in Testing". The award is part of the Hong Kong Youth Science and Technology Innovation Competition, one of the largest and most popular science competitions in Hong Kong, which consistently attracts close to 4,000 entries from more than 400 schools.



HKCTC members Dr Gray Ho (upper left), Dr Ann Leung (upper right) and Mr Eddie Lee (lower left) formed the judging panel and conducted the online judging

Under the competition, student teams were required to submit their original research projects or inventions in one of the five subjects – mathematics and engineering; chemistry and materials; biology and health; energy and environmental science; computer and information technology. Eleven finalists, with projects related to testing, were then selected to compete for the HKCTC Special Award. The judging panel, formed by HKCTC members, Dr Gray Ho, Dr Ann Leung and Mr Eddie Lee, interviewed each finalist team, listened to their presentations and asked follow-up questions. At the presentation ceremony held at the Hong Kong Science Park in August 2022, Prof. Wong Wing-tak, Chairman of HKCTC, and Dr Ann Leung, Member of HKCTC, presented the awards to the top three student teams.

The judges were impressed by the passion of students in addressing different global issues as well as needs and challenges in daily life. Some student teams used their creativity in an attempt to mitigate environmental problems like pollution and exhaustion of landfills. Others tried to come up with feasible solutions for addressing health and hygiene concerns. The judging panel was particularly pleased that the finalists had made testing an integral part of the process of research and development. "To substantiate their scientific solutions, students conducted numerous tests, with reference to relevant international standards, to verify their data and ascertain the safety and performance of their inventions. Some teams even went the extra mile by also taking factors ranging from commercialisation to marketisation into consideration in the development process. The competition has irrefutably raised youngsters' awareness and interest in testing and certification," the judging panel said.

First Place Grand Award Project: "Brewing" Sustainable Fabrics from Tea and Medicinal Herbs

The Chinese Foundation Secondary School: Chong Kin Chung Alvin, Chow Yui Yui Coco, Chung Yan Ho Luther

Keenly aware that it takes substantial resources to produce writing paper, the team developed a type of "bio-paper" with properties superior to those of the recycled paper currently available in the market. The team discovered that, after fermentation of black tea, a strong but pliable biofilm known as SCOBY would be formed. Bio-paper could then be produced upon dehydration of the biofilm.

To prove their bio-paper is a better alternative than other kinds of paper, the team followed relevant international standards and set up a series of tests to compare their bio-paper with regular copy paper, recycled paper and "washable" paper. These included rigorous testing for water absorption, tensile strength, and the contact angle of water droplets. "This bio-paper outperforms recycled paper when it comes to tensile strength, printability and writability. It therefore has the potential to replace recycled paper," the team said.

The development of the bio-paper was by no means a plain sailing. The team revealed that they lacked professional equipment in their school laboratory for the water absorption test. Confronting the problem, they made their own high-precision "Cobb Tester", using latex gloves, measuring cups, and other readily available materials. "Through the project, we learnt different methods of professional testing as well as the ability to tackle problems and challenges," the team said. They cherished very much the experience gained from participating in the competition.



Prof Wong Wing-tak (first right), the Chairman of HKCTC, and Dr Ann Leung (first left), the member of HKCTC, presented the First Place Grand Award to students from The Chinese Foundation Secondary School: Chung Yan Ho Luther (second left), Chow Yui Yui Coco (middle) and Chong Kin Chung Alvin (second right)

Second Place Grand Award Project: Edible Disposables Made of Kombucha from Fruit Skins 3.0

Carmel Pak U Secondary School: Kwan Ho Ting, Ho Cheuk, Tang Kai Yeung



Carmel Pak U Secondary School: (from left) Ho Cheuk, Tang Kai Yeung and Kwan Ho Ting

With a view to reducing food waste and developing eco-friendly materials to replace plastic, the team came up with the idea of using fruit peels to produce kombucha, a cellulose membrane obtained from brewing fruit skins in sugar solution, and roasting these kombuchas to produce disposable cups and straws. These tableware have a high level of biodegradability, have good strength and are water-proof and edible.

Safety and quality are particularly important as the products will come into direct contact with food and drink. The team therefore studied related laws and standards on food and made reference to various international and Chinese quality standards for cups and straws. "These cups and straws have passed a number of tests such as water leakage resistance and heat endurance. Besides, no bacterial colonies were found present in drinking water soaked with the cups and straws for 2 hours. We consider these roasted kombucha cups and straws are suitable for serving as disposable tableware," the team explained.

"The project provided great exposure for us as we were able to use devices such as the UV-VIS spectrometer for the first time," the team shared. "We now understand that testing should be repeatable and thorough which, in turn, assures consumers of the safety of our products. We also realise that perseverance and team spirit are part and parcel when it comes to the pursuit of truth."

Third Place Grand Award Project: Research Study on Biodegradable Bioplastic 2.0

SKH Bishop Baker Secondary School: Chau Hei Lam Zoe, Pang Sze Yan and Chu Chi To

With growing concerns of the environmental problems caused by conventional petroleum-based plastics, the team aimed to develop an alternative solution, making bioplastics by using food waste. The team found out that chitosan and tapioca starch, extracted from the usually discarded skin of cassava, could be a viable alternative without exacerbating the risk of food shortages.

The 2.0 version is an improved version as the biodegradability of the bioplastic was enhanced. "Based on test results, we found that, by using an optimal composition of 70% chitosan and 30% tapioca flour, the bioplastic so synthesized would be completely biodegraded by 60% within 22 days. These eco-friendly bioplastics have good tensile strength and can be utilised to produce different products like disposable utensils, folders, etc.," the team said.

It took meticulous planning and close collaboration for the team to complete the project. Under COVID-19 pandemic, the team could not conduct experiments in a well-equipped school laboratory. Instead, they worked out the methodology online, assigned the tasks needed to set up tests, researched international standards and referenced scientific literature at home. They conducted experiments at school once face-to-face class resumed. The team said, "our project doesn't stop here. In the meantime, we are coming up with ways to synthesise anti-bacterial bioplastic with silver nanoparticles which can be used at hospitals and clinics."



SKH Bishop Baker Secondary School: (from left) Pang Sze Yan, Chu Chi To and Chau Hei Lam Zoe