

# SCIENCE CONTEST RAISES STUDENTS' INTEREST IN TESTING AND CERTIFICATION

Testing and certification plays an essential part in ensuring the quality and safety of different products and services, thereby safeguarding consumer interests. As an ongoing effort to enhance local youngsters' understanding of the importance of testing and certification, the Hong Kong Council for Testing and Certification (HKCTC) has co-organised the "HKCTC Special Award for Outstanding Project in Testing" with the Hong Kong New Generation Cultural Association since 2016. The award is part of the Hong Kong Youth Science and Technology Innovation Competition, which is the largest and most popular science competition in Hong Kong with nearly 4,000 applicants from over 400 schools participating in this annual event.

Student teams were invited to submit original research projects or inventions under the heading of either mathematics, physics and engineering; chemistry and materials; biology and health; energy and environmental science; computer science and information technology; creative coding; or intelligent design. Eleven finalists with projects related to testing were then chosen to compete for the HKCTC Special Award on the day of final judging. The judges interviewed each finalist team, listened to their three-minute presentations and asked follow-up questions to select the top 3 award winners.



The HKCTC Chairman, Prof. Albert Yu (third right), and Members, (from left) Dr George Lau, Stephanie Lam, Dr Ann Leung, Patrick Lee and Stephen Liang formed the judging panel of the Special Award.

Overall, the judges were impressed by the innovation and creativity of the participants. Students are inspired by needs of the community and developed feasible solutions to address different pressing issues. The judges noted that participating students were aware of the importance of testing and how vital it is in various aspects of everyday life. "Under the COVID-19 pandemic, there were high demand for sanitisers and protective equipment and the public has become increasingly aware of the importance of quality. Proper testing can provide quality assurance and boost consumer confidence," the panel said.

The judges were pleasantly surprised that the finalists had conducted repetitive experiments to achieve reliable results. Their practical scientific solutions were substantiated with a lot of testing data. They also did a lot of research to ensure that their tests were conducted in compliance with relevant international standards. The competition has no doubt raised youngsters' awareness and interest in testing and certification.

## First Place Grand Award Project: Kombuchas as Bio-disposables 2.0

Noting the threat of global plastic pollution, the winning team looked into the feasibility of developing biodegradable alternatives using substances derived from food waste. Kombuchas are cellulose membranes obtained from fermentation. The team made use of roasted kombucha extracted from fruit skins to produce straws and cups which are biodegradable and have good strength. This project is an improved version as the team had used lemon skins instead of orange skins to produce kombucha cups and straws. "The pH value of lemon skins is more suitable for forming kombuchas, and thus the required time for roasting the fruit skin is lower. The kombucha cups and straws were made harder too," the team said.

The team conducted online research on relevant international standards such as the Chinese standard for disposable tableware and the ISO standard for drinking straws. By making reference to these established standards, they did a number of tests to ensure that the cups and straws meet with the requirements in different aspects such as safety, temperature resistance, biodegradability, and load bearing performance. "To ensure accuracy and reliability of test results, we had done numerous tests and carried out data comparisons to produce the prototype. Through that process, we realised that thorough testing requires diligence and patience," they said. The competition incentivised them to acquire scientific knowledge and to develop innovative solution to tackle daily life problems. They envisioned that the use of kombucha of fruit skins could be applied in other utensils in the future.



Carmel Pak U Secondary School: Leung Wai-chung, Ng Ka-ho and Tam Kwan-chun Kenny

## Second Place Grand Award Project: Investigating the feasibility of utilising clam shells to produce plastic like polymers



Victoria Shanghai Academy: Li Hei-yiu Mathias and Suen Hiu-tung Sophia

With the growing concerns on synthetic plastic and food waste, the first runner-up team has also tried to find a solution to solve the environmental problem. The team has investigated ways to turn clamshells, a common food waste, into chitosan polymers. They extracted chitin through demineralisation and deproteinisation, and then converted them to chitosan using chemical deacetylation. To ensure the safety and quality of the bioplastic, different tests on fracture toughness, tensile strength and water hygroscopic behaviour were conducted.

"Under the COVID-19 pandemic, we could not conduct test and trial in the well-equipped school laboratory. Instead, we tried to simplify some of the testing methods and utilise easily accessible chemical substance at home," the team members said. They realised that not all tests that generate accurate results require costly materials. This has boosted their interest in testing. In future, the team hoped that the appearance of the bioplastic could be improved using 3D printing and the prototype could go into mass production.

## Third Place Grand Award Project: Anti-bacterial Crab Bio-bandages with Bio-dressing 2.0

The second runner-up team's project featured an eco-friendly anti-bacterial crab bandage made from Chitin extracted from hairy crab shells. Chitin can be transformed to chitosan which is known to be anti-bacterial and haemostatic. Chitosan can be further converted hydrogel which is biodegradable and has good water absorbance. So, crab hydrogels provide good alternatives of commercial available bandages which are neither biodegradable nor anti-bacterial.

The team has looked into enhancing the performance and safety of the bio-bandage and produced an upgraded version with one additional layer, namely the outer water-proof bio-dressing. Commercial adhesive might also be added to the new prototype to make it more appealing to users. To prove that the bio-bandages are eligible to be used on human skins, the team conducted in-depth research on compatibility of bio-bandage with relevant international standards and requirements. They carried out tests for various properties such as antibacterial ability and absorbency and concluded that the bio-bandage complies with the existing standards. "We performed countless experiments with more than 200 hairy crab shell to obtain accurate data and learned to pay closer attention on data analysis," the team said. "This competition helped us understand the importance of testing and certification and enabled us to appreciate the stringent requirements behind every product and service."



Carmel Pak U Secondary School: Li Hiu-fung, Or Hiu-ying and So Yan-wing