

Technology Frontier

News Bite on PolyU's Innovation

CareCoatex™ Antimicrobial Coating

Research excellence meets entrepreneurial mindset for impact and social good

Amid the pandemic, people care more about personal and environmental hygiene than ever. A long-lasting disinfectant coating that can be applied on high-touch surfaces would be instrumental to stop the spread of pathogens. In this regard, a professor from the Department of Applied Biology and Chemical Technology formed a startup with a chemical manufacturer to develop CareCoatex™ antimicrobial coating, a non-toxic, eco-friendly spray that kills 99% of common pathogens and lasts up to six months. The partnership stands as a testimony to the synergetic effect of collaboration between academia and industry.



Prof. Pauline Pei Li (left) and Mr Tenny Lam

Amid the COVID-19 pandemic, people are more concerned about environmental hygiene than ever. Most of us still remember vividly how the hoarders snatched up bleach, alcohol, and hand sanitiser. Disinfectants effectively kill pathogens such as coronaviruses, but high-touch surfaces, such as elevator buttons and handrails, need frequent re-application to be free of germs. Moreover, certain disinfectants may be irritating to human skin while others may pose health risks upon prolonged exposure. Toxic chemicals may also leach and get into our ecosystem, contaminating water and other resources. In light of this, scientists and researchers have been looking for a solution with a long-lasting antimicrobial effect on various surfaces, while being safe for humans and the environment. Prof. Pauline Pei Li from the

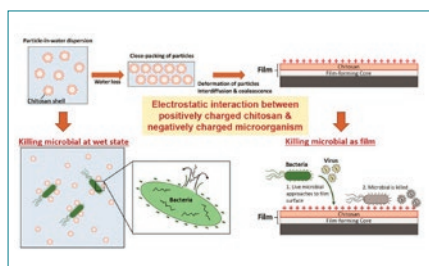
Department of Applied Biology and Chemical Technology partnered with Mr Tenny Lam to develop CareCoatex™ antimicrobial coating, a non-toxic and eco-friendly spray that kills 99% of common bacteria and viruses, with long-lasting action of up to 6 months. Mr Lam is a DBA candidate at PolyU, the owner of a chemical company, and a member of the CEO Club established by PolyU.

Amphiphilic core-shell particles

As early as 2003, Prof. Li was granted a patent on her groundbreaking core-shell particle technology, which can be a perfect solution for creating a safer and long-lasting antimicrobial coating. "Core-shell particles have two layers. Traditionally, the two layers usually have similar chemical properties, either water-based or oil-based. "My technology was



CareCoatex™ antimicrobial coating



Contact killing and time-release killing properties of CareCoatex™

revolutionary because I managed to combine two incompatible layers in one particle, so that the end product is amphiphilic – having both water- and oil-based components,” explained Prof. Li. Her unique core-shell particle can be made up of an oil-based core and a water-based outer shell. After the spray is applied, water evaporates and the oil-based cores would fuse with each other firmly, forming a durable coating.

Natural biopolymers that kill germs

Unlike traditional core-shell particles that are made from monomers, Prof. Li’s technology allows the use of polymers, such as natural biopolymers, as starting materials. “I believe using natural antimicrobial biomaterials would be the safest option to humans and the environment, and my core-shell technology makes it possible. I modified food-grade chitosan from crustacean shells and encapsulated thymol from the culinary herb thyme to further boost their natural antimicrobial properties.”

Chitosan forms the outer shells of the particles in CareCoatex™ spray and they create a positively charged water-based layer over the oil-based film-forming cores. Negatively charged pathogens will interact electrostatically with the chitosan-thymol based particles and get killed. Experiments show that it kills 99% of common bacteria and viruses. “The coating offers not only contact killing, but also time-release action for as long as 6 months. Besides high-touch surfaces like doorknobs, elevator buttons, and medical devices, it can be sprayed on fabric and clothing items, or even used in antiseptic wipes.”

Comradeship in entrepreneurial adventure

Though Prof. Li had brilliant ideas

and expertise, the technology can never be translated into real impact without the support from a savvy manufacturer. Right then, our DBA candidate, Mr Lam, a veteran executive in the information technology sector at that time, happened to inherit his family’s chemical business. “I wanted to revitalise the traditional business with cutting-edge technologies, and that was when I met Prof. Li. I was impressed by the huge untapped potential of her technology right away,” he said. Instead of licensing her technology or soliciting her consultancy service, he decided to form a startup with Prof. Li. “I believe the commercialisation of research outcomes is a long-term process. I’m committed to working closely with Prof. Li in a long run and explore various possibilities. The best way to achieve that would be forming a partnership.”

Mr Lam thanked IfE at PolyU for reviewing their business plan and offering a 10-week boot camp that honed their acumen. In 2020, their startup Grand Rise Technology Limited successfully secured investment from an angel investor, with a matching fund from the PolyU Tech Launchpad Fund (TLF) Scheme. They also partnered with one of the leading listed chemical giants in Hong Kong, taking CareCoatex™ to the next level with its established sales and customer service network all over China.

In March 2021, CareCoatex™ antimicrobial coating won a Gold Medal at the “Special Edition 2021 Inventions Geneva Evaluation Days - Virtual Event”, the online version of the prestigious International Exhibition of Inventions of Geneva.