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National University of Singapore students Su Yee Shien (at left) and Sophia Ding, both 22, have helped devise a recipe that dissolves the adhesive layer between the plastic and aluminium in medication strips, so that the materials can be sent for recycling instead of being incinerated.
ST PHOTO: LIM YAOHUI

NUS students find way to help recycle medicine packaging

Team testing their chemical process on medication strips provided by NUH

Shabana Begum

Thousands of people take prescription medication daily in Singapore and throw away the packaging strip without a second thought.

About five million medicine strips are thrown away every month in Singapore, said Ms Sophia Ding, founder of student initiative the Green Doctors Programme, and final-year civil and environmental engineering student at the National University of Singapore.

But none of the strips – made of plastic and aluminium heat-sealed together with glue – can be recycled unless they are first separated.

It is difficult to separate the materials in this multi-layer packaging, so the strips are usually discarded as general waste.

Plastic is a well-known pollutant while aluminium is widely sought after for use in a range of sectors.

To avoid having to throw them in incinerators, a group of engineering students from the National University of Singapore (NUS) came up with a chemical recycling method to separate plastic from aluminium and salvage both components.

They can then be sent to recycling companies.

The Green Doctors Programme was born last August when a pharmacist from the National University Hospital (NUH) approached the NUS department of Civil and Environmental Engineering to find a way to reduce medical waste.

Every month, commonly prescribed medicine at NUH accounts for about 200,000 strips being used up.

Chemical recycling involves adding substances to the waste materials to break down their structures.

Ms Ding declined to elaborate on her team's process to salvage the plastic and aluminium in the medicine strips, as it is still in the early research phase.

After three months of research, the Green Doctors Programme earlier this year concocted a recipe to dissolve the adhesive layer between the plastic and aluminium, so that the materials can be separated.

The team, which includes about 10 chemical, environmental and mechanical engineering students, has been testing and working to optimise their solution using medicine strips provided by NUH.

"There were only two research papers on recycling medical blister packaging," said Ms Ding, 22.

"So it was very difficult for us to come up with the methodology ourselves because we had to infer and go into the roots of the materials.

"And we had to think about the technology that goes behind heat-sealing, and how to separate the layers without doing much harm to the original materials."

If all medicine strips in Singapore were to be recycled, 16 tonnes of plastic and two tonnes of aluminium could be saved each month, she added.

According to the World Health Organisation, about 85 per cent of all waste from healthcare activities is non-hazardous, general waste.

The remaining 15 per cent is biohazardous waste that is infectious, toxic or radioactive, and must be collected and disposed of safely and carefully to prevent cross-contamination and other public health risks.

In a written answer to a parliamentary question about medical waste in May 2021, former Health Minister Gan Kim Yong said the amount of biohazardous waste generated in Singapore increased from 4,400 tonnes in 2016 to 5,700 tonnes in 2020.

The Covid-19 pandemic exacerbated the issue in 2020, due to additional infection control and biosafety measures.

Professor Seeram Ramakrishna, chairman of the NUS Circular Economy Taskforce, said much suitable medical or pharmaceutical waste is not recycled due to the challenges in segregating and precleaning before recycling, in case it is biohazardous.

But he noted that recycling industries are keen on trying to recycle plastics and other disposables that have been treated and certified as non-biohazardous.

Recently, hospitals and healthcare players here have been taking gradual steps to reduce their medical disposables and recycle them.

nshab@sph.com.sg

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Number of tonnes of plastic that could be saved every month, along with two tonnes of aluminium, if all medical strips in Singapore were recycled. About five million strips are thrown away every month in Singapore.

STICKY PROBLEM

There were only two research papers on recycling medical blister packaging. So it was very difficult for us to come up with the methodology ourselves because we had to infer and go into the roots of the materials. And we had to think about the technology that goes behind heat-sealing, and how to separate the layers without doing much harm to the original materials.

MS SOPHIA DING, on how her team had initially found it difficult to find out how to salvage the plastic and aluminium in the strips.