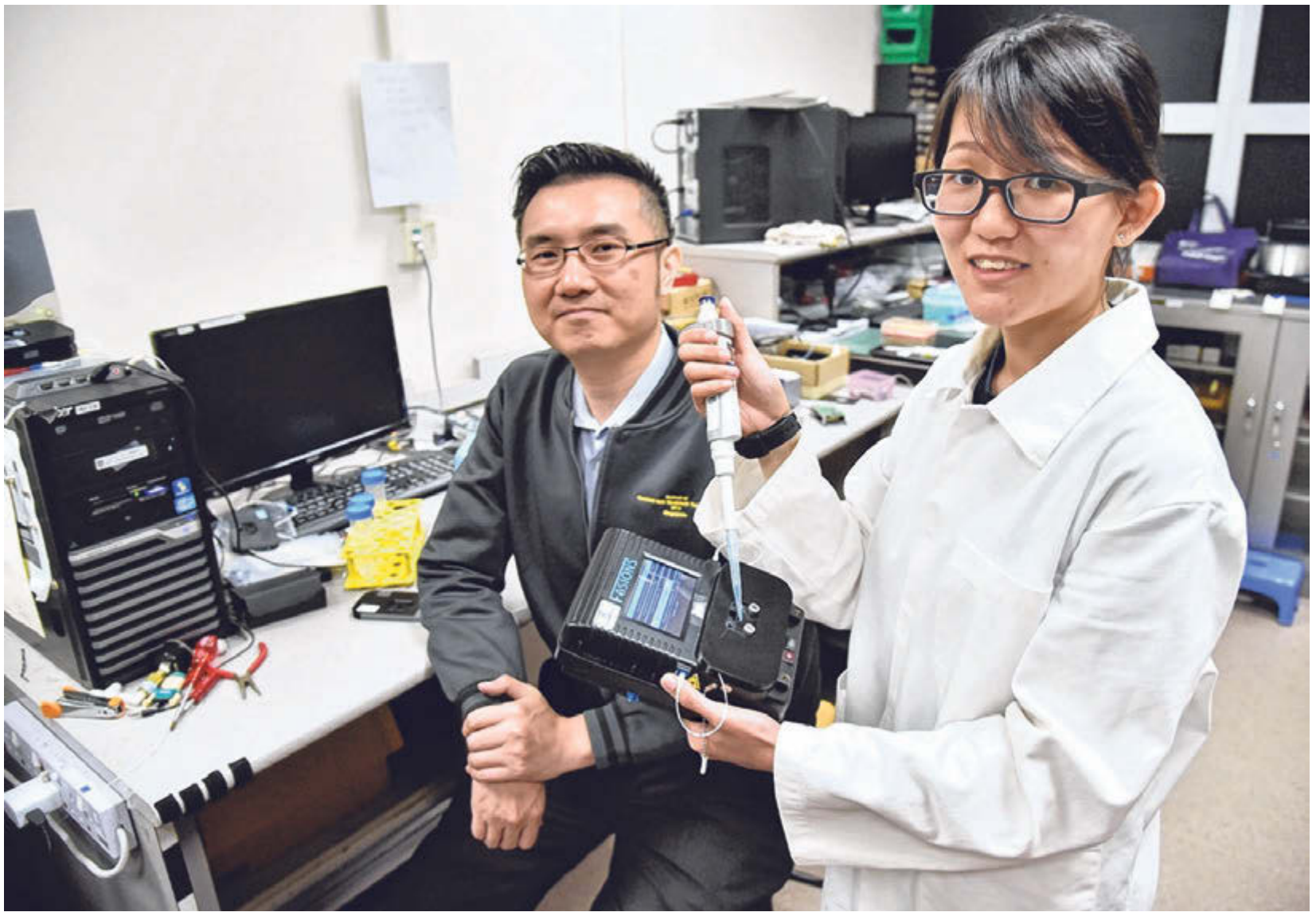

Prof Yong Ken-Tye with PhD student Stephanie Yap, who is holding a prototype of the device that can quickly detect trace levels of heavy metal contaminants in drinking water. It can identify 24 types of metal contaminants, double the number that commercially available devices can detect. ST PHOTO: JASMINE CHOONG

NTU team invents handy device to measure water quality

Shabana Begum

Marrying biology with engineering, scientists at a local university have drawn inspiration from a process naturally occurring in the human body to come up with a handheld device that measures water quality.

When heavy metals, such as lead, mercury and arsenic, are found in blood, a natural substance known as a chelating agent is activated to identify the metals and bind to them.

The agent prevents the metal from interacting with other substances and the metal is then excreted from the body.

Drinking water contaminated by heavy metals is harmful to health.

Two scientists from Nanyang Technological University's School of Electrical and Electronic Engineering replicated the process in the portable device.

They added the chelating agent into the device's sensor so that the agent will bind with the dissolved metals to find out the amount of trace metals in drinking water samples.

Only a few drops of water are needed for the test, which takes about five minutes.

"Using a chelating agent in the device ensures that its sensor is as sensitive in detecting heavy metals as the body's natural defence mechanism against metal poisoning," said Associate Professor Yong Ken-Tye, one of the two scientists. He was speaking to the media about the device at NTU yesterday.

The invention, which was published in scientific journal ACS Sensors last year, was funded by NTU's Nanyang Environment and Water Research Institute and NTUitive, the university's innovation and enterprise company.

Given how serious water pollution is in parts of Asia, such as China, Pakistan and India, the scientists are aiming to make the device commercially available in about two years.

"In remote areas, villagers can use the device to monitor the quality of water collected from the wells," said Prof Yong.

The device costs between $2,000 and $3,000 to build in the lab. With mass manufacturing, Prof Yong reckoned the price could drop to between $800 and $1,000.

PRACTICAL USE

In remote areas, villagers can use the device to monitor the quality of water collected from the wells.

ASSOCIATE PROFESSOR YONG KEN-TYE, one of the two scientists involved in the project.

There are similar devices in the market, but their tests are more time-consuming as the water samples must first be mixed with a buffer solution. Their sensors must also be used within 30 minutes because of sensitivity to air, heat and humidity.

In contrast, the NTU device can withstand high temperatures of up to 40 deg C.

It can also identify 24 types of metal contaminants, double the number that commercially available devices can detect.

The NTU team, which took three years to come up with the device, spun off a company last year to commercialise it.

The company, Waterply, is currently working with a firm in China to shrink the device to the size of a smartphone and to also include more functions, such as measuring pH levels and soil moisture.

The scientists are also developing an app to store data from lakes and rivers in parts of Asia so that countries can track the changes in water quality over time.

"For instance, officials in India can test the water quality of a pond during the monsoon season," said Prof Yong.

"The data collected in the app will show a trend in the amount of heavy metals in the water body over the months. The trend will help them predict the water quality over the next few months and for the next monsoon season."

nshab@sph.com.sg