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Singapore

NTU scientists invent portable device for quicker monitoring of heavy metals in drinking water

Associate Professor Yong Ken-Tye (left) and PhD student Stephanie Yap are part of the team behind the device. (Photo: NTU Singapore)

SINGAPORE: Nanyang Technological University (NTU) scientists have invented a portable device that can detect trace levels of heavy metal contaminants in drinking water in just five minutes.

Drinking water quality is typically monitored using highly accurate laboratory tests that take at least a day to complete, NTU said in a media release on Monday (Apr 15). Lab tests are necessary as heavy metals cannot be identified by colour, taste or odour unless present at high levels.

NTU's device, however, uses an organic substance found in the human bloodstream called a chelating agent, which detects and binds to heavy metal ions and marks them for excretion from the body.

The device generates test results quickly without the need to bring samples back to laboratories, facilitating on-site water testing. (Photo: NTU Singapore)

The device combines a chelating agent with an optical measurement system and requires just a few drops of a water sample in a disposable sensor cartridge to detect heavy metals at parts-per-billion precision.

This means the device can detect lead levels of five parts per billion, which is more precise than the 10 parts per billion limit stipulated by the Environmental Public Health Act in Singapore.

Associate Professor Yong Ken-Tye, one of the scientists behind the device, said the use of a chelating agent ensures its detection is as sensitive as "the body's natural defence mechanism against metal intoxication".

He added that the device can detect up to 24 types of metal contaminants, double the capacity of other commercially available water sensors.

While there already are portable devices on the market that can quickly detect heavy metal contaminants, NTU said they might require the additional step of mixing the water sample with a buffer solution before performing the test.

The sensor for such kits also has to be used within 30 minutes after exposure to air, it added, as its effectiveness can be affected by air, heat or humidity.

Furthermore, NTU said devices that use metal electrodes like mercury as a sensing probe could introduce heavy metal contaminants back into the environment, while colour-changing test strips could lead to results based on subjective readings of the strip.

Beyond efficiency, the device can be integrated into domestic

appliances such as water filtration systems and electric kettles.

"The device can easily be integrated into any existing in-line water treatment plant," said Professor Tjin Swee Chuan, another scientist behind the device. "While our product is competitive enough to penetrate the market, we are still working to enhance and expand our water sensor product line."

The NTU team has set up a company called Waterply to commercialise the device. It is working with other local companies to collect more data through the device to improve its accuracy.

Waterply is also collaborating with a state-owned company in China to develop next-generation water sensors that can tackle water pollution.

Source: CNA/hz(hm)