NTU researchers develop long-lasting anti-fog coating that 'self-cleans' under sunlight

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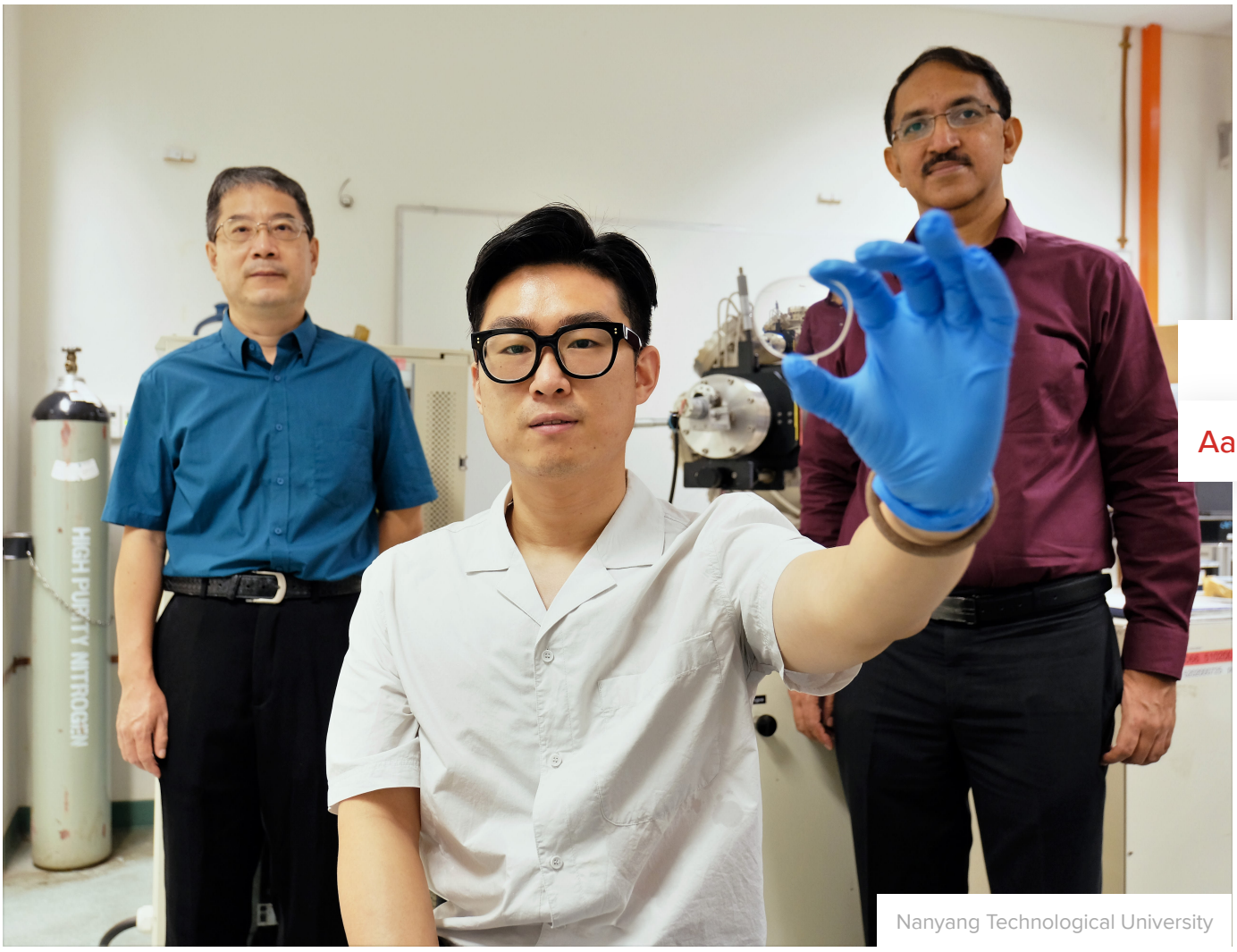

Nanyang Technological University

(From left) Professor Chen Zhong, PhD student Sun Ye and Professor Rajdeep Singh Rawat are part of a research team behind a new anti-fog coating for various surfaces.

- Scientists at Nanyang Technological University (NTU) have developed a new type of anti-fog coating for plastic surfaces that they claim lasts longer than existing solutions in the market
- Experiments showed the coating was able to clear water droplets very quickly
- It is also able to break down contaminants after exposure to ultraviolet light, the scientists said
- It could potentially be applied to various plastic surfaces such as spectacles, surveillance cameras and road mirrors

SINGAPORE — Scientists at Nanyang Technological University (NTU) have developed a new type of anti-fog coating for plastic surfaces claimed to last for years without the need for reapplication. The coating is also said to be able to break down contaminants such as bacteria and dirt when exposed to sunlight.

In a news release on Tuesday (Feb 22), the university said that the new coating overcomes the current limitations of anti-fog sprays and wipes, which are temporary since they cannot withstand washing and must be reapplied regularly.

The NTU team, speaking in a separate media briefing on Tuesday, said that the coating could be used on spectacles to prevent them from misting up while face masks are worn. The effect is said to last for as long as one to two years.

Other applications for the coating include surveillance camera covers and road mirrors.

HOW IT WORKS

The coating, which comprises a double-layered silicon dioxide-titanium dioxide film, is applied on plastic surfaces using a two-step technique that researchers said improves adhesion and durability.

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Fogging happens when tiny water droplets form on surfaces due to condensation, which then scatter light and reduce visibility.

Explaining how the coating's anti-fog properties work, Professor Chen Zhong, co-principal investigator of the study, said that the film will quickly spread water droplets into a thin layer, allowing light to pass through the surface.

Experiments done on the coating showed that it was able to spread a water droplet within 93 milliseconds. In comparison, the duration of an average blink is 100 milliseconds.

Titanium dioxide also gives the coating its ability to self-clean, by reacting with ultraviolet light to break down organic residues.

Prof Chen, of NTU's School of Materials Science and Engineering, said: "It's able to, with time, decompose these organic (contaminant) components into some carbon dioxide and water so that the surface remains clean and remains anti-fogging."

This would allow the coating to last longer compared to existing solutions, without the need to reapply it in between, Prof Chen said, adding that the exact duration would depend on the way it is used as well.

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Using applications on spectacles as an example, he said: "If you properly use it, I would guess we're talking about years — one year, two years and so on. But of course, if you abuse it, nobody can help."

Asked by the media if the coating can also kill the coronavirus causing Covid-19 and do away with the need to constantly sanitise surfaces, Prof Chen said that it would.

Addressing the possible disadvantages of the novel coating, Mr Sun Ye, a PhD student at the School of Materials Science and Engineering who is also first author of the study, said that the coating process involved in the study is more tedious and expensive, and would need to be optimised to bring down costs at an industrial scale.

Professor Rajdeep Singh Rawat, the study's co-lead researcher, said that it would be too early to comment on the actual costs of this coating, noting that even prices of existing solutions in the market change over time due to various factors such as demand and volume of production.

Prof Rajdeep, who is head of the natural sciences and science education academic group at the National Institute of Education, highlighted though, that while the anti-fog coating is novel, the two-step process of applying it to surfaces uses well-established industrial methods.

“The cost, as such, should be very reasonable,” he added.

NTU said in its statement that the research team has filed a Singapore patent for the innovation and is looking to strike up industrial collaborations to take the innovation from lab to market.

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