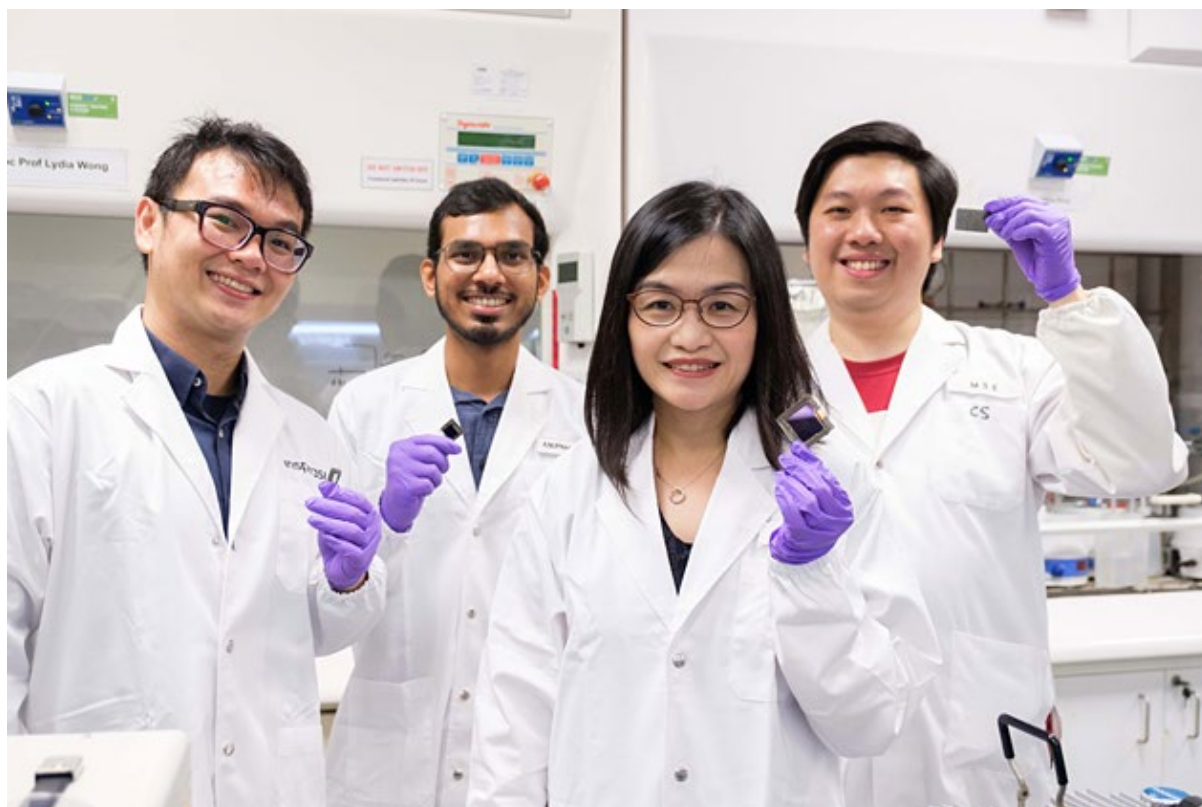


October 2026

Translated from Japanese

"Artificial leaves" generate hydrogen from seawater and decompose toxic substances: Nanyang Technological University, Singapore

On September 16, Nanyang Technological University (NTU) in Singapore announced that researchers have developed an "artificial leaf" that uses sunlight to generate hydrogen from seawater while simultaneously breaking down hydrazine, a toxic pollutant found in industrial wastewater. The research findings were published in the academic journal *Nature Communications*.

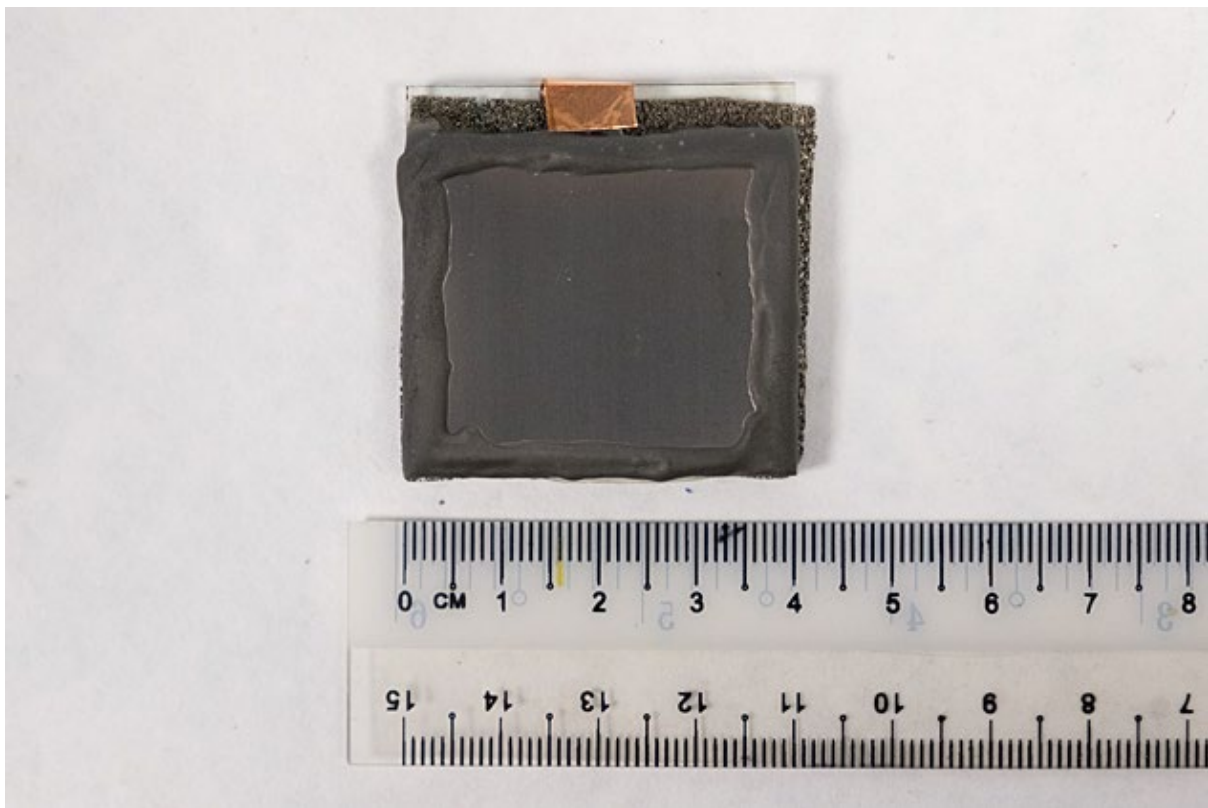


Professor Lydia H. Wong (second from the right) and members of the research team

The leaf-inspired device directly utilizes sunlight to convert it into electricity, allowing the reaction to proceed without an external power source. While using seawater directly eliminates the need for a desalination process, the chloride ions in seawater hinder electrolysis, reducing efficiency and leading to the generation of corrosive and toxic chlorine compounds that can damage electrodes.

Professor Lydia H. Wong and her colleagues at the School of Materials Science and Engineering at NTU used a catalyst containing iron, cobalt, and chromium as the anode. The reaction in which this catalyst decomposes hydrazine into hydrogen and nitrogen requires less energy than the reaction that produces oxygen in the electrolysis of water. Therefore, hydrogen can be efficiently produced from water with less energy at the cathode, which utilizes sunlight, and hydrogen is produced at the anode while removing hydrazine. The formation of chlorine compounds is also suppressed.

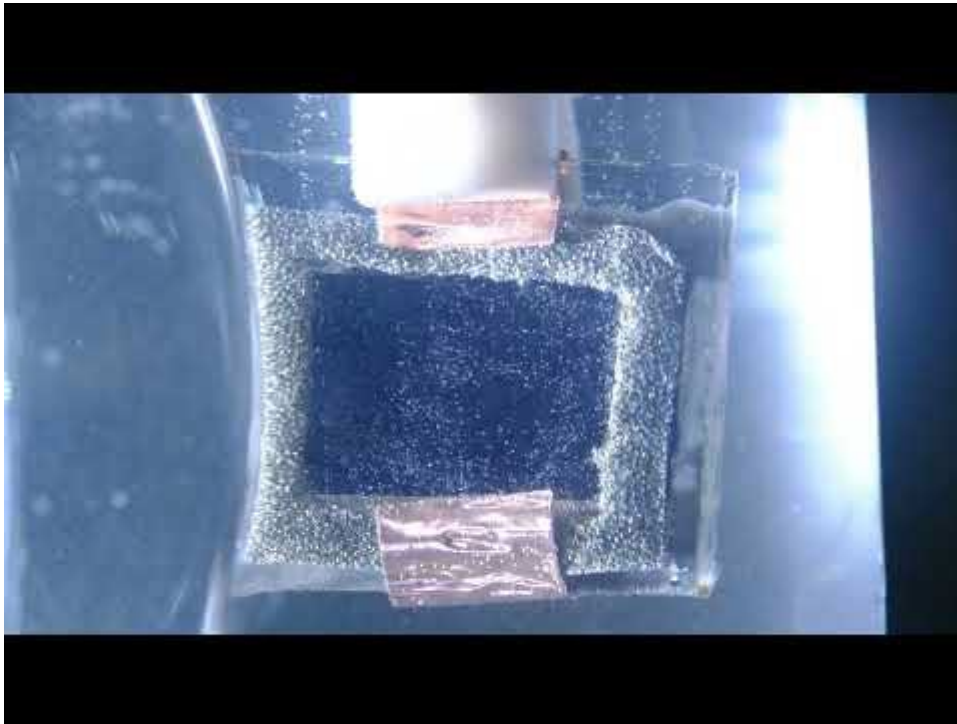
The cathode used a lead halide perovskite that converts light into electricity, and to prevent degradation, it was covered with a conductive epoxy resin containing silver and copper particles and titanium foil. In tests using simulated and actual seawater, the photocurrent density reached 25 mA/cm^2 , which was particularly high among the values reported for lead perovskite cathodes. It operated stably for over 72 hours under irradiation levels equivalent to sunlight reaching the Earth's surface on a clear day, and produced hydrogen at a rate of $466 \text{ } \mu\text{mol/cm}^2/\text{hour}$, comparable to similar solar-powered devices.



This device produces clean fuel while simultaneously removing contaminants.

This method decomposes hydrazine within 30 hours without separating it from water, reducing its concentration from 0.5 M (approximately 1.6% by weight) to 0.5 ppb. The professor stated, "By efficiently utilizing solar energy to decompose toxic industrial pollutants and simultaneously obtaining clean fuel, we are addressing both energy and

pollution problems." The research team is developing catalysts for applications such as processing other pollutants and producing fuels and industrial chemicals from waste.



When light is shone on the device, hydrogen is generated at both the anode and the cathode. (Source: NTU)

Paper presented: Ahmed et al. (2026) Self-powered artificial leaf using perovskite photocathode for solar hydrogen production and hydrazine degradation.

https://spap.jst.go.jp/asean/news/261004/topic_na_02.html