Solar-powered system harvests clean water from air

A solar-powered system for producing clean water from vapour in the air has been developed by engineers at the University of Texas.

The technology is being touted as useful for disaster situations, water crises or poverty-stricken areas and developing countries.

It relies on hydrogels, gel-polymer hybrid materials designed to be ‘super sponges’ that can retain large amounts of water.

The hydrogels are highly water absorbent but release the fluid upon heating. This combination has been successfully shown to work in humid and dry weather conditions and is crucial to enabling the production of clean, safe drinking water from the air.

With an estimated 50,000 cubic kilometers of water contained in the atmosphere, this new system could tap into those reserves and potentially lead to small, inexpensive and portable filtration systems.

“We have developed a completely passive system where all you need to do is leave the hydrogel outside and it will collect water,” said postdoctoral researcher Fei Zhao. “The collected water will remain stored in the hydrogel until you expose it to sunlight. After about five minutes under natural sunlight, the water releases.”

The technology builds upon a 2018 project where the researchers made a solar-powered water purification system using hydrogels that cleans water from any source using only solar energy.

The team’s new innovation takes that work a step further by using the water that already exists in the atmosphere.

For both hydrogel-based technologies, the research team developed a way to combine materials that possess both hygroscopic (water-absorbing) qualities and thermal-responsive hydrophilicity (the ability to release water upon simple heating).

“The new material is designed to both harvest moisture from the air and produce clean water under sunlight, avoiding intensive energy consumption,” said associate professor Guihua Yu, who led the team.

While harvesting water from moisture is not a new concept, it typically requires lots of energy to perform that action.

The University of Texas team’s technology requires only solar power, is compact and can still produce enough water to meet the daily needs of an average household. Prototype tests achieved a daily water production of up to 50 litres per kilogram of hydrogel.

The technology could also replace core components in existing solar-powered water purification systems or other moisture-absorbing technologies.

In 2018, a research team from the University of California, Berkeley, demonstrated that contaminated storm water [can be used as drinking water](https://eandt.theiet.org/content/articles/2018/08/engineered-sand-cleans-up-storm-water-for-drinking/)when filtered through specially prepared sand.

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