Hydrogel based water purification system 12 times better than current systems

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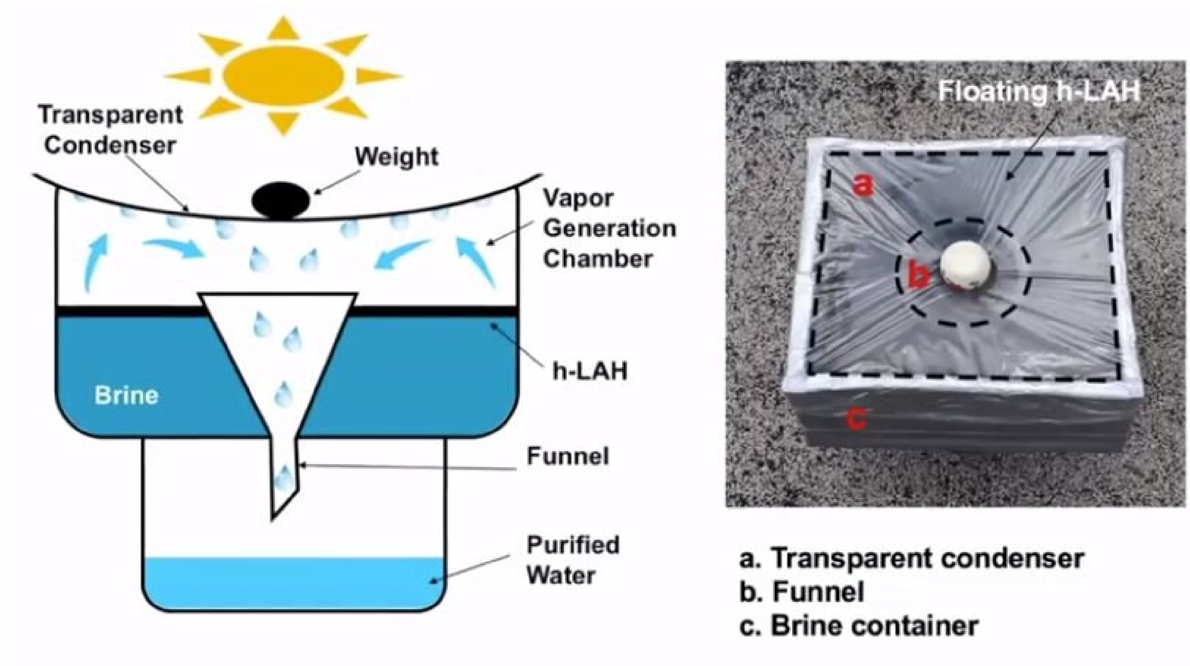

A team of researchers from the University of Texas at Austin, collaborating with a group from the Lockheed Martin Corporation, has developed a new hydrogel-based water purification system—it is approximately 12 times better than existing commercial systems. In their paper published in the journal *Science Advances*, the group describes their system and how well it tested.

The world needs an inexpensive way to extract drinkable water from dirty water. Every day, millions of people are forced to drink water that is unfit for human consumption. In many cases, the places that need the water the most are not included in large purification efforts, thus, personal systems are needed. The most common way to purify water in small amounts is to make and use a solar-based water distillation system in which a bottle painted black on the bottom is exposed to the sun. As the water evaporates, it collects on the upper exposed surfaces of the bottle and trickles down into a container. While this method works quite well as a means of extracting clean water, it is very inefficient as evaporation starts only when the bottle and its entire contents are heated. In this new effort, the researchers developed a vastly more efficient systems.

The new work by the team was based on work they did last year. In that effort, they created a sponge-like material made from two hydrogels—one was water-binding, the other light absorbing. When the sponge was placed atop the dirty water in a solar still, it forced the water inside to evaporate faster than normally. This was due to the layer of water that was touching the sponge forging weaker hydrogen bonds. That effort pushed the efficiency of the solar still to 3.2 $L/h/m^2$ of water—which, the researchers claim, was more than twice the theoretical limit. In this new effort, the researchers improved that efficiency even more by adding chitosan (another polymer) to the mix. Doing so allowed the sponge to hold more water, leading to faster evaporation. This pushed the efficiency of the solar still to 3.6 $L/h/m^2$, which, the researchers claim, is 12 times better than commercial units.

More information: Xingyi Zhou et al. Architecting highly hydratable polymer networks to tune the water state for solar water purification, *Science Advances* (2019). DOI: 10.1126/sciadv.aaw5484

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