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# Electric Sweat

## Synthetic leaf generates power with tiny beads of water

**When water evaporates** from a tree leaf, it triggers a chain reaction that can pull other water molecules all the way up the trunk of a 90-meter-tall redwood. Each molecule attracts the one behind it, creating a continuous stream from the roots to the leaves.

Now Michel Maharbiz, a researcher at the University of California, Berkeley, wants to harness that process to generate tiny amounts of electricity.

Maharbiz's team has created a synthetic leaf about the size of a postage stamp that mimics the evaporation (or, more accurately, transpiration) of water from trees—but adds a twist to produce power along the way. The synthetic leaf is made of two glass plates, one etched with a network of minuscule branching tunnels. Each tunnel ends in an opening that simulates the pore on a leaf. When the device is filled with water, droplets evaporate from the openings and prompt the remaining fluid to move through the tunnels.

That movement alone doesn't produce electricity. So the team placed two charged metal plates around the main tunnel and injected air bubbles into the water. When a bubble moved between the plates, it changed their electrical charge, resulting in a current.

The power output is small—less than one ten-thousandth the amount needed to run a cell phone. But the synthetic leaf could still be useful for recharging batteries in environmental or building sensors, says study leader Ruba Borno, who reported the work in *Applied Physics Letters*. The research team is now working to replace the manually injected air bubbles with plastic gears so the "leaf" can run continuously on its own. ❧

—Roberta Kwok

# An Ounce of Prevention

## High-tech chip delivers early diagnosis of coral disease

**After the September 11, 2001,** attacks, Todd DeSantis and his colleagues at Lawrence Berkeley National Laboratory started developing a device to detect airborne pathogens released by terrorists. The technology was designed to take a quick census of microbes, allowing officials to raise an alarm if dangerous bacteria appeared. Now, the same technology could be used to assess the health of coral reefs.

Corals contain microbial communities that can undergo changes when the corals get sick. Desantis says his team's system could detect these changes more quickly and cheaply than other methods, offering an early warning of coral disease.

Dubbed PhyloChip, the device contains a glass slide blanketed with DNA strands from known microorganisms. In the lab, researchers apply bacterial DNA from coral samples to the slide. Sequences that match DNA on the slide will "stick" to those strands, allowing a computer program to later identify the microbes. In one study, a team at the University of California, Merced, used the PhyloChip to find 1,441 distinct microbes in a single sample, eight times more than a costlier sequencing method.

Scientists could eventually use the PhyloChip to identify corals in the early stages of illness, says study leader Shinichi Sunagawa. If the diseases are linked to sources such as agricultural runoff or tourism, managers could act to reduce those pressures before it's too late. ❧

—Roberta Kwok


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