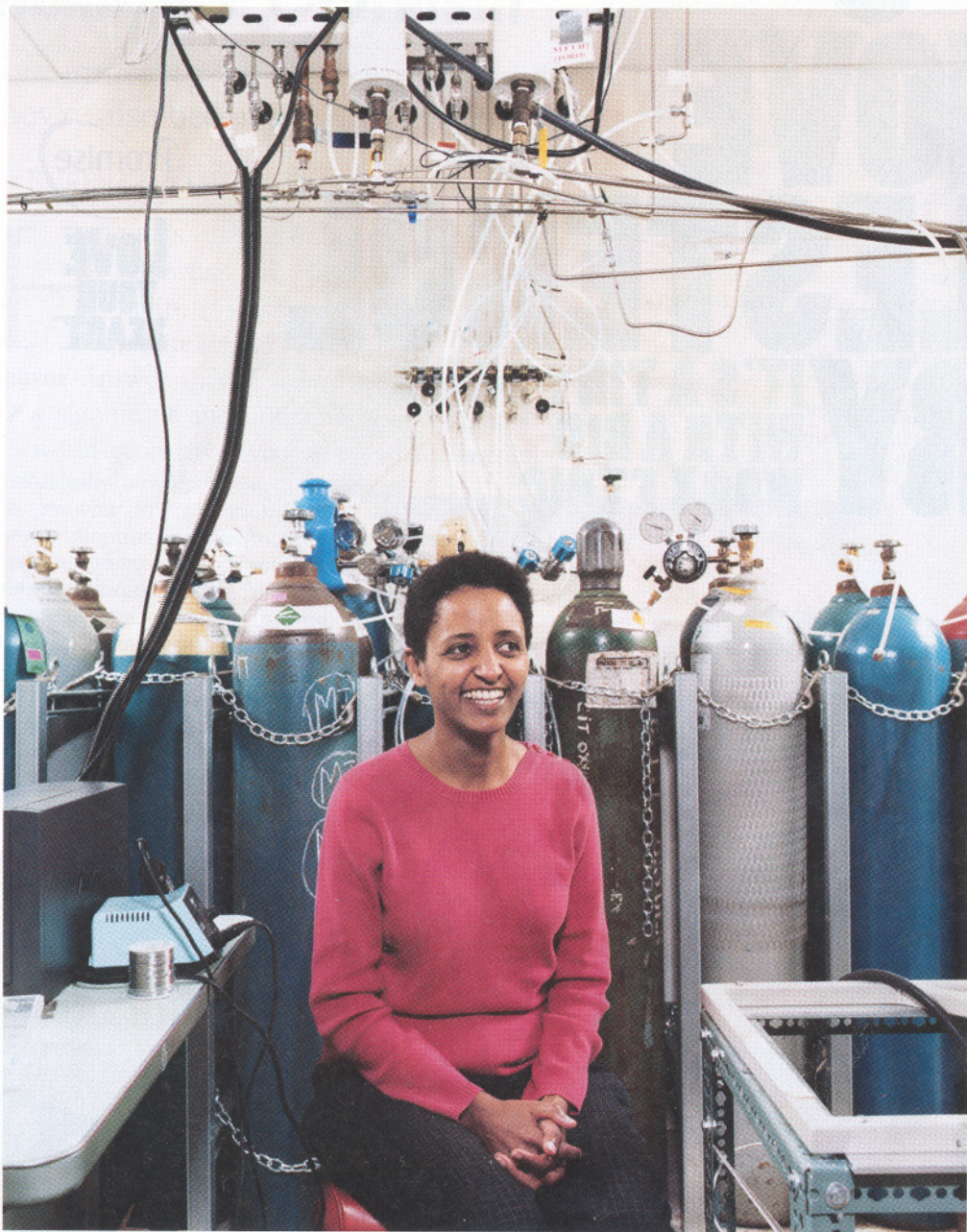


SCIENCE SOSSINA HAILE

The Power Behind Cooler, Greener Energy



Sossina Haile created a new type of fuel cell by default. In the late '90s, the Caltech scientist had an idea that she thought might dramatically improve fuel cells, the clean technology that converts chemical energy to electricity to power cars, buses and power plants. Haile's idea was to employ an entirely new type of "superprotonic" compound that might help supply power at dra-

matically lower cost. But when fuel-cell makers balked at re-vamping their entire systems to try her solution, Haile decided to fabricate the world's first solid-acid fuel cell in her lab. Early in 2008 a Pasadena, Calif., start-up called Superprotonic—founded by two of her former grad students—will ship the first commercial prototypes to energy-systems makers. The output is barely enough to power a 100-

watt bulb, but hopes are high that the small start will someday produce powerful fuel cells for commercial use. "This is potentially a breakthrough technology," says former senator Bill Bradley, who sits on the Superprotonic board.

She's hardly alone in seeing the promise of fuel cells, which produce energy through chemical reactions; their chief emission is pure water. (To prove that point, Haile once drank the

tailpipe emission of a fuel-cell car on camera.) Not only do we need to find carbon-neutral fuel sources to slow global warming, but the world's energy needs will continue to grow—by an estimated 50 percent by 2050. Today, small fuel cells power a few cars and buses (Honda will begin leasing a fuel-cell FCX Clarity next summer), while large ones produce electricity at some factories and universities. They are expensive, but Haile's fuel cells may be cheaper and more durable.

Haile, a mother of two, has never followed a conventional path. Her family fled Ethiopia during the coup in the mid-'70s, after soldiers arrested and nearly killed her historian father, then settled in rural Minnesota before Haile, now 41, went to MIT and grad school. Superprotonic launched in 2003, with Haile as science adviser.

Haile's discovery may someday fill a need for a fuel cell that generates power at midrange temperatures. Low-temperature cells (20 degrees to 100 degrees Celsius) require costly platinum catalysts to speed the reactions; superhot "solid oxide" fuel cells react easily, but require expensive ceramic materials that can withstand operating temperatures of 600 degrees to 1,000 degrees Celsius. Finding a material that operates well in a midrange "is quite important," says Jack Brouwer, associate director of the National Fuel Cell Research Center at the University of California, Irvine, though he adds that it's too early to say if Haile's cell will be commercially viable.

Haile is confident it will, but she's also busy "tweaking" high-temperature systems to increase power output and lower costs. For her, the race to find new energy sources is fascinating. She says, "There's nothing better than being able to combine an intellectually exciting topic with the knowledge that it will be beneficial. To me, that's just glory."

—ANDREW MURR