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This image shows ionic liquids (the blue globules) in a beaker of mineral oil
John Wilkes

# Ionic Liquid Energy Storage Can Result in Metal-Air Batteries

*Spin-off manages to secure funds to investigate the system*

Scottsdale, AZ-based Fluidic Energy, a spin-off from Arizona State University (ASU), recently managed to secure the fundings it needed to continue its research into making ionic liquid energy storage feasible, Technology Review reports. According to experts at the company, the metal-air batteries that would result from this line of investigation have the potential to considerably outperform today's best lithium-ion batteries. The additional funding the company needed, in the amount of $5.13 million, came from the US Department of Energy (DOE).

The only requirement that the DOE had was that the investigation resulted in batteries that had ionic liquids as electrolytes, rather than an aqueous solution. The final goal that Fluidic Energy has is to design a battery capable of holding about 11 times more energy than top-notch lithium-ion batteries, but at only 33 percent of the costs, representatives from the start-up say. "I'm not claiming we have it yet, but if we do succeed, it really does change the way we think about [electricity] storage," ASU Professor of Materials Science and Fluidic Energy founder Cody Friesen says.

Because water is so limited in what it can do, ionic liquids are touted as the better alternative for use in metal-air batteries. "They're wonder fluids. They're remarkable. If you look at these liquids in a bottle, they look like water, except they're viscous. They're not volatile, they don't evaporate, they're physically stable and they conduct electricity fairly well," the head of the US Air Force Academy Chemistry Department, John Wilkes, says. He is also an ionic liquids expert. The USAF has been experimenting with these fluids since the 1980s, because they can resist temperatures both higher and lower than water can, without evaporating or disintegrating.

"These liquids have electrochemical stability windows of up to five volts, so it allows you to go to much more energy-dense metals than zinc," Friesen adds. Conversely, water begins to break apart at voltages of just 1.23 volts. The scientists say that metal-air batteries using these fluids as electrolytes last for longer, because water does not prematurely evaporate, forcing the battery to fail ahead of time. Additionally, the entire structure gets a density boost that allows it to store much more energy than conventional lithium-ion devices.