With the demand for batteries continually on the rise, the time is ripe for an alternative to lithium, the material making current batteries. Enter potassium, as researchers at the Rensselear Polytechnic Institute discover a means to turn the metal into a potential power source.

While lithium is expensive and mined using environmentally damaging means, potassium is cheap, abundant and easier to work with. It also offers energy densities (by both volume and weight) comparable to lithium in the shape of full potassium anodes. However potassium, like lithium, has a problem called dendrite formation. Essentially, during charging and discharging bits of metal attach to the anode and form dendrites, or spiky branch-like structures. Dendrites grow until they poke through the membrane separating the anode from the cathode, reducing the lifespan of the battery and increasing the risk of short circuits.

However, using potassium, the researcher claim to have a means to avoid dendrite formation. It involves operating the full potassium anode battery at a "relatively high" charge and discharge rate, raising the temperature in a controlled manner. The heat encourages dendrites to self-heal in the potassium-based battery, a process the researchers compare with the sun melting a pile of snow after a storm.

Such a technique is technically possible with lithium-ion batteries, but the potassium metal battery requires less heat for the self-healing process. The researchers envision a battery with a system generating heat when not in use in order to self-heal from dendrites, something not possible when using alternative materials.

"I want to see a paradigm shift to metal batteries," researcher Nikhil Koratkar says. "Metal batteries are the most efficient way to construct a battery; however, because of this dendrite problem they have not been feasible. With potassium, I'm more hopeful."

Go Potassium Metal Battery Emerges as a Rival to Lithium-Ion Technology