Written by Marco Attard
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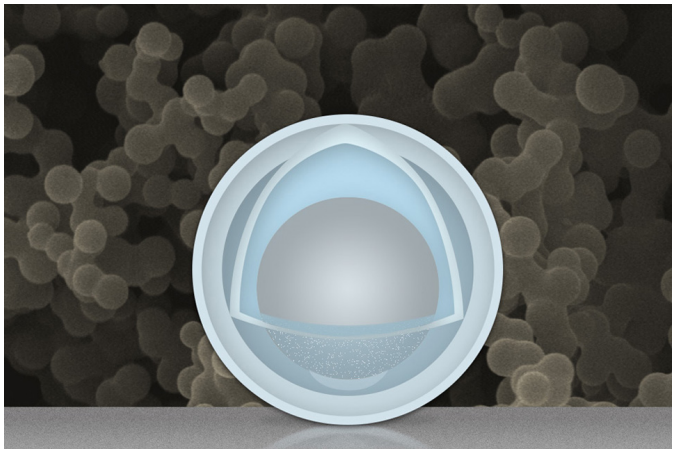
Eggs are not just one of the best breakfast foods-- scientists at MIT and Tsinghua University use egg-y inspiration to create a "yolk-and-shell" nanoparticles boosting the capacity and power of lithium-ion batteries.



The "egg" in question consists of an aluminium nanoparticle (the "yolk") surrounded by a titanium dioxide (aka titania) "shell." According to the researchers the combination is a "high-rate champion among high-capacity anodes," meaning it can lead to the more powerful batteries of the future.

Current lithium-ion batteries use graphite anodes with a storage capacity of 0.35 ampere-hours per gram (Ah/g). Researchers have been long looking into better performing alternatives, but most fall short. For instance, lithium mettle might store much energy per gram but is prone to short circuits or catching fire, while silicon and tin have high capacity that drops at high charging or discharging rates. Another potential replacement is aluminium, with a theoretical capacity of 2 Ah/g.

Enter the aluminium-titania (ATO) nano eggs. Normally aluminium particles inside the anode contract and expand when going through charge/discharge cycles, leading to battery degradation. However the addition of the titania shell protects the aluminium particles, bringing about a longer lasting battery.

Furthermore, the researchers say manufacture of the ATO nano eggs is "simple and easily scalable." Full cell tests using lithium iron phosphate cathodes have been successful, meaning such batteries should be close to reaching real-life applications soon enough.

Go "Yolks" and "Shells" Improve Rechargeable Batteries