Researching materials to optimize battery performance

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Creating environment friendly energy storage systems, non-explosive and with charge/discharge long-term cycles, motivated a group of scientists from the Autonomous Metropolitan University, Campus Iztapalapa (UAM -I), to research which polymeric materials have the properties to maintain the highest level of energy in a lithium - ion

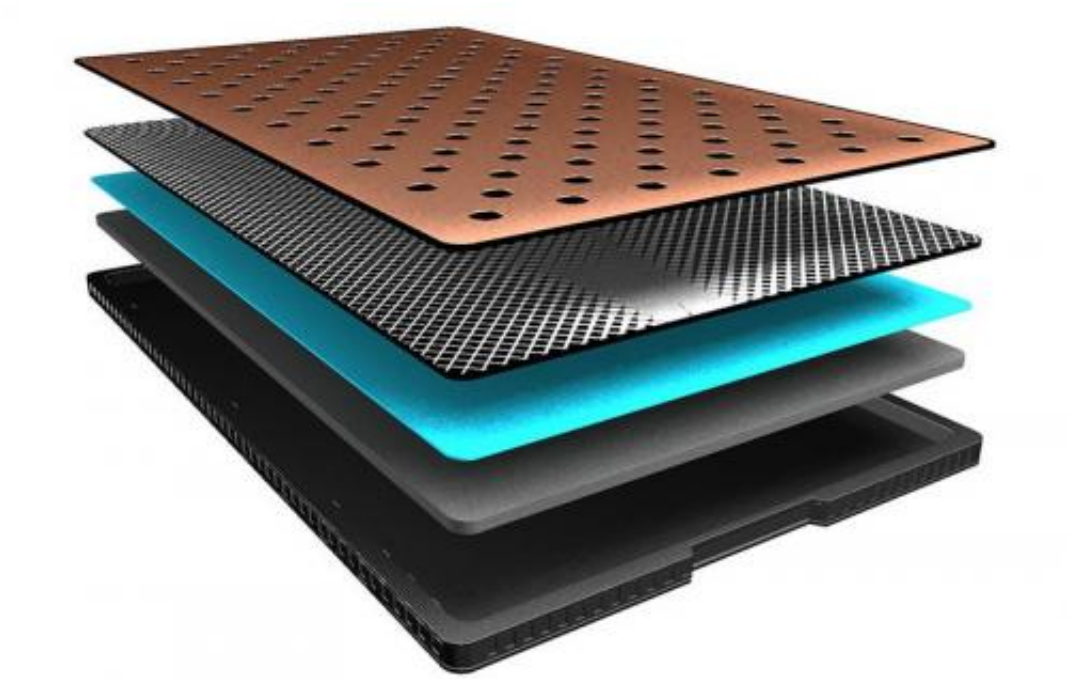
battery.

According to Judith Martinez Cardoso, co-head of the project at the Department of Physics, this research was supported by the Ministry of Science, Technology and Innovation of the Federal District. "Our commitment is to design batteries that can replace those currently used in the Public Transport System Metro, of nickel- cadmium, which are highly polluting and when breaking eliminate fluid that can cause serious toxicity problems."

She also notes, that this development would also achieve the creation of optimized polymer electrolyte lithium-ion rechargeable batteries for electric or hybrid vehicles, computers, cell phones and camcorders, including portable systems.

This material (polymer electrolyte) is similar to plastic and, in solid state, has the ability to contain the lithium inside a battery, because of its low weight enables greater amount of driving electric charge with a lower weight.

"A battery is a current generator because it transforms chemical energy into electrical, in this case provided by the processing of materials containing lithium, in the two electrodes that are part of the generator and in the polymer," Ignacio Martínez González explains, a project partner within the Department of Chemistry at UAM -I.



The market has made available lithium-ion rechargeable batteries since late last century, but they have several disadvantages. According to the researchers, batteries tend to deteriorate if stored unloaded, support a limited number of charges, are expensive and can overheat to the point of exploding.

"Because it requires an electrolyte (which dissociates a lithium salt) to lead the charge, the problem was that manufacturers have used chemicals that can degrade and generate this explosion," said Martinez González.

For these reasons, according to researchers, the lithium-ion batteries have been modified to prevent bursting. Furthermore, different countries are working on technologies that have a higher yield and making them safer for users.

In fact, says Martinez Cardoso, it was the problem that presented some Boeing aircrafts with its lithium- ion battery, which contained organic liquids that became flammable when a critical temperature was reach. "Hence, our work is aimed to use non-toxic and non-explosive materials, such as polymers."

"Although we still lack a prototype, we are developing three very important elements, such as the chemicals that will carry the two electrodes and the polymer system that will contain the electrolyte. The idea is to have greater capacity to store energy and a durable cycle of loading and unloading without losing efficiency, "said Martínez González.

It also states that the objective is to design a safe technology, at a low cost and efficient enough to meet the needs of energy storage and increase the capacity of the batteries. "The polymer electrolyte we work with has great potential to be used, so we are building cells to test this material as a whole together with the lithium electrode."

So far, the research team has used synthetic type materials; however, they have a widespread interest in using biological polymers to make the batteries biodegradable and avoid creating any environmental damage.

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