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In the future, electric car batteries can be made from tamarind shells.

By Gustavo Minari | Edited by Douglas Ciriaco | July 20, 2021 at 6:21 pm

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Many people have heard that tamarind is a great antioxidant and anti-inflammatory, that its pulp is rich in vitamins A, C and E or that the fruit from Africa has an acidic and sweet taste at the same time. Now, scientists at Nanyang Technological University in Singapore have managed to prove that it is possible to turn tamarind husks into an energy source for electric vehicles.

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By processing the carbon-rich fruit rinds, the researchers transformed the waste material into carbon nanosheets that can be used in the manufacture of supercapacitors — devices used by industry to build electricity storage cells.

“Through a series of analyses, we found that the performance of our tamarind shell-derived nanosheets was comparable to their industrially made counterparts, with porous structure and electrochemical properties. The process for making the





reducing waste

Tamarind peels are usually discarded during the manufacturing process of foods, such as candy and juices made from the fruit. Because they are bulky and difficult to store, they take up a lot of space in landfills, where they are left as agricultural waste without being reused.

In addition to finding a new form of efficient energy storage, the researchers hope that the expansion of the use of carbon nanosheets can reduce the environmental impact caused by the dumping of organic material as a by-product of industrialized food manufacturing processes.

"The use of tamarind husks can reduce the amount of space needed to dispose of waste in landfills, especially in regions in Asia such as India, one of the world's largest producers of tamarind and which also faces final disposal problems", he recalls physics professor G. Ravi, co-author of the study.



Professor Steve Dang and the tamarind shells used in the manufacture of carbon nanosheets (Image reproduction/NTU)





To create the carbon nanosheets, scientists washed and dried the tamarind husks at 100 °C for about six hours. Dehydrated, they were ground and made into a powder that was baked in a furnace for two and a half hours at a temperature between 700 and 900 °C.

With this process that eliminates oxygen, the researchers were able to convert the material into ultra-thin sheets of carbon. As tamarind husks are porous and rich in this element by nature, they are ideal for the manufacture of these ultra-thin sheets with good thermal stability and electrical conductivity.



Fabrication scheme for carbon nanosheets (Image: Reproduction/NTU)

“Carbon nanosheets are composed of layers of carbon atoms arranged in interconnected hexagons, like a honeycomb. The secret behind its energy storage capabilities is its porous structure, which has a large surface area and helps the material to store large amounts of electrical charges,” adds Dhayalan Velauthapillai, head of the advanced nanomaterials research group for clean energy and health applications from the Norwegian Western Norway University of Applied Sciences, which also participated in the study.

The idea now is to expand studies to increase the production of carbon nanosheets in partnership with agricultural producers, in addition to reducing the energy needed in the manufacturing process, making it more ecological. In the future, the team plans to explore different types of fruit skins to build cheaper and more efficient energy storage devices.

