Science & Technology

# Scientists convert tamarind shells into vehicle energy sources

henryhendricks • 6 hours ago

Tamarind pods and shell fragments. Credit: Public domain CC0.

Tamarind shells, a tropical fruit consumed around the world, are discarded during food production.

Due to the bulkiness of tamarind shells, they occupy a considerable amount of space in landfills and are disposed of as agricultural waste.

However, a team of international scientists led by Nanyang Technological University (NTU Singapore) in Singapore has found a way to address this issue.

Scientists have converted waste into carbon nanosheets by treating carbon-rich tamarind shells. It is a key component of supercapacitors, energy storage devices used in automobiles, buses, electric vehicles, trains and elevators.

This study reflects NTU's commitment to tackle the grand challenges of sustainability for humankind as part of its strategic plan for 2025, which aims to accelerate the transformation of research discoveries into innovations that mitigate environmental impact. doing.

A team of researchers from NTU Singapore, the University of Applied Sciences in West Norway in Norway, and the University of Aragappa in India believe that scaling up these nanosheets will be an environmentally friendly alternative to industrially produced ones. I am. At the same time, it reduces waste.

Associate Professor (Steve) Quantan of the Department of Electrical and Electronic Engineering at NTU, who led the research, said:

"Through a series of analyzes, we found that the performance of tamarind shell-derived nanosheets is comparable to that of industrially produced nanosheets in terms of porous structure and electrochemical properties.

The process of making nanosheets is also the standard method for making activated carbon nanosheets. "

Professor G. Ravi, Dean of the Faculty of Physics, co-authored with Assistant Professor R. Yuvakkumar of the University of Aragappa, said:

"Tamarind shells can reduce the amount of space required for landfill, especially in regions of Asia such as India, one of the world's largest producers of tamarind, which is tackling waste disposal issues. . "

This study was published in a peer-reviewed scientific journal Chemosphere..

**Carbon nanosheet step-by-step recipe**

To produce carbon nanosheets, researchers first washed the tamarind fruit shells, dried them at 100 ° C for about 6 hours, and then ground them into powder.

Scientists then baked the powder in an oxygen-free oven at 700-900 degrees Celsius for 150 minutes to convert it into ultra-thin carbon sheets called nanosheets.

The carbon-rich and porous nature of tamarind shells makes it an ideal material for the production of carbon nanosheets.

A common material used to make carbon nanosheets is industrial hemp fiber. However, it must be heated above 180 ° C for 24 hours. This is four times as long as the tamarind shell and is at a higher temperature. This is before hemp is exposed to even more intense heat and converted to carbon nanosheets.

Professor Dhayalan Velauthapillai, head of the Advanced Nanomaterials Research Group for Clean Energy and Health Applications at the University of Applied Sciences in West Norway, who participated in the study, said: Honeycomb. The secret behind their energy storage capacity lies in their porous structure, which leads to a large surface area that helps the material store large amounts of charge. "

Nanosheets derived from tamarind shells also exhibit excellent thermal stability and electrical conductivity, making them a promising option for energy storage.

Researchers want to explore large-scale production of carbon nanosheets with agricultural partners. They are also working to reduce the energy required for the manufacturing process and make it environmentally friendly, trying to improve the electrochemical properties of nanosheets.

The team also wants to explore the possibility of producing carbon nanosheets using different types of fruit peels and shells.

Scientists convert tamarind shells into vehicle energy sources

https://knowridge.com/2021/07/scientists-convert-tamarind-shells-into-energy-source-for-vehicles/ Scientists convert tamarind shells into vehicle energy sources