University of Central Florida

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Concentrated Power Storage with Instant Nanopatterned Carbon Electrodes

Background

The ability to make highly efficient micro- and nanoscale energy storage devices is the key to unlocking more power capacity at smaller sizes. Among energy storage devices, carbon-based super capacitors have motivated considerable research and development efforts because of carbon's light weight, high electrical conductivity, and chemical and electro-chemical stabilities at low cost. Building on these benefits, nanostructured carbon increases capacitance by increasing surface area. However, while carbon nanostructures are highly beneficial as the electrodes for energy storage applications, conventional production techniques can be very time-consuming, dependent on toxic chemicals, resource-wasteful, expensive, unreliable, variable, and not scalable for mass-production.

Advantages

Now, UCF researchers have developed a method for producing superior carbon nanostructures in approximately 99% less time than conventional methods, with ease. Using no expensive and toxic chemicals, the process works at room temperature with no need for external pressure and can be repeated several hundred times with high precision. Enhancing the surface area of a super capacitor with nanopatterns can improve its capacitance up to twenty times, enabling smaller power sources with the same or greater performance than their conventional counterparts.

Technical Details

This simple and high throughput system and method develops nanostructured carbon electrodes using a spin-on nano printing technique with a carbon precursor polymer, such as, but not limited to, polyacrylonitrile. These nanostructures can then be seamlessly converted using laser carbonization process into patterned carbon nanopillar array electrodes.

UCF Inventor

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Benefits

- Enables higher energy capacity
- Scalable
- Quick
- Simple

Applications

- Batteries
- Capacitors
- Hydrogen storage devices

Tech Field

Nanotechnology

Keywords

carbon, nano, nanopattern, nanostructure, polyacrylonitrile, PAN, laser carbonization, electrode

If you or your company are interested in this opportunity, Contact:

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