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Use of a Cloth of Cellulose (Cotton) Fibers as a Base for Growth of Graphene (Carbon) Nanopetals

A low-cost, high-surface-area conductive electrode material is generated by growing carbon nanopetals on carbonized cellulose cloth using microwave plasma chemical vapor deposition.

Currently, conductive copper, nickel sheets, and carbon cloth are being used as a substrate to grow graphene nanopetals and metalized nanopetals for applications where a conductive sheet with a large surface area is necessary. These substrate materials are expensive and the carbon cloth is expensive to manufacture. Most applications that use these conductive materials are cost sensitive; therefore, there is an unmet need for a low-cost material with higher surface area for use in such applications.

Researchers at Purdue University have developed a technology for the growth of carbon nanopetals using cloth comprised of cellulose fibers, such as cotton, as a base material. During the microwave plasma chemical vapor deposition (MPCVD) process, the cellulose fibers convert to conductive carbonized fibers and carbon nanopetals are grown on their surface in an integral fashion. This process increases the effective surface area of the cloth while transforming it from an electrical insulator to an electrical conductor. Growing the carbon nanopetals on the fibers of the cloth increases the effective surface area of the electrically conductive, carbonized cloth base. This technology provides a low-cost base for the generation of conductive electrodes with increased surface area for sensors and supercapacitors.

Advantages:

-Low-cost base for the growth of carbon nanopetals

-The graphene nanopetals that grow can be used in low-cost applications

-Conductive electrode material generation with increased surface area

Potential Applications:

Technology ID

2015-FISH-67072

Category

Energy & Power Systems/Energy Storage

Materials Science & Nanotechnology/Nanomaterials & Nanostructures

Materials Science & Nanotechnology/Advanced Functional Materials

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TRL: 4

Intellectual Property:

Provisional-Patent, 2015-01-27, United States | Utility Patent, 2016-01-27, United States

Keywords: Carbon nanopetals, cellulose fibers, cotton base material, microwave plasma chemical vapor deposition, MPCVD, carbonized fibers, conductive electrodes, increased surface area, sensors, supercapacitors, electronics manufacturing, low-cost conductive material, Cellulose, Graphene, Materials and Manufacturing, Mechanical Engineering, Sensors, Supercapacitors