Enhanced Performance of Lithium-Ion Batteries

Anchoring single-walled carbon nanotubes to silicon oxide nanoparticles to increase electrochemical performance of Lithium-ion batteries

Georgia Tech Inventors from the School of Chemical and Biomolecular Engineering have anchored SWNTs to the surface of high-capacity anode materials using conjugated polymers with polar functionalities. This has enabled the formation of SWNT electrical networks, enabling Li-ion batteries to withstand repeated high capacity active material volume changes that occur during charging and discharging. This configuration of SWNTs also allows for a reduction in electrode resistance, higher stability, and enhanced electrode kinetics within the batteries. By anchoring the SWNTs, electrochemical performance and longevity is increased within batteries and can contribute to their implementation in industry.

Summary Bullets

- **Increases efficacy of Li-ion batteries** – increases conductivity
- **Product longevity** – increased stability during charging and discharging
- **Enables practical implementation** – can be applied on a larger scale

Solution Advantages

- **Increases efficacy of Li-ion batteries** – increases conductivity
- **Product longevity** – increased stability during charging and discharging
- **Enables practical implementation** – can be applied on a larger scale

Potential Commercial Applications

- Emergency Power Backups
- Electric Vehicles
- Solar Power Storage
- Li-ion Batteries
- Electronic Devices

Background and More Information

Lithium(Li)-ion batteries are one of the most commonly used type of battery used in home and portable electronics. Current high capacity Li-ion batteries are limited in their stability and reusability due to the breakage

of electronic pathways that occur with massive volume changes.Nanomaterials have increasingly been incorporated into electronics, optics, and other areas of materials science due to their extraordinary properties. In particular, single-walled carbon nanotubes (SWNTs) can possess either metallic or semiconducting behaviors and are great conductors. SWNT’s have also become inexpensive and very easy to handle. Utilizing SWNTs provides a way to prevent degradation of high capacity active materials within batteries.

Inventors

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Publications

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