



University of Central Florida

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Combined Energy Transmission and Energy Storage in a Single Cable

Introduction

A revolutionary cable developed by UCF researchers can transmit and store electricity at the same time. The cable combines the energy transmission capability of a copper wire, its core, with energy storage made possible by a hybrid battery-supercapacitor, the cable's outer layer. Cables and batteries constitute the foundation of many electrical systems, and the combination of electrical conduction and energy storage in a single cable has been non-existent until now. By storing energy around electrical cables and combining the advantages of a battery's higher energy density with a supercapacitor's higher power density and cyclability needed for quick surges of power, the new cable enables advances including power storage in a flexible or molded fabric weave and lighter-weight vehicles requiring less fuel. The new technology is applicable to any wired electrical system that benefits from power storage. The cable's flexibility and space-saving nature can revolutionize the design of innumerable electronics—from consumer products like smaller and lighter smartphones, encased with woven, molded energy-storing cable and woven-cable garments able to charge devices, to public sector and military applications for lighter, more fuel-efficient hybrid and all-electric vehicles, heavy machinery, aircraft, and spacecraft.

Technical Details

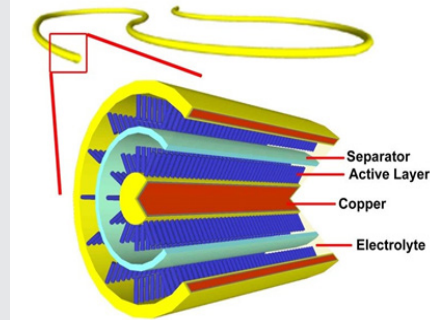
The energy-storing cable's formation begins with a core conductor wire, on the surface of which nanowhiskers of insulating copper oxide are grown, perpendicular to the wire. The 100-fold increase in surface area enables a higher level of capacitive energy storage. These nanowhiskers are then coated with an alloy of gold and palladium to form the supercapacitor's current collector, followed by an electrochemically active coating of manganese oxide. The first layer is then complete and separated from a second layer of the same composition as the first by a solid electrolyte and porous polymer. Increased surface area from the two layers, each featuring many nanowhiskers, enables high energy storage around the conventional copper coaxial wire for energy transmission.

UCF Inventors

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Keywords

cable, electrical, battery, semiconductor, supercapacitor, energy storage, energy transfer, transportation, aerospace, defense



Benefits

- Combined energy transmission and energy storage in a single cable
- Bendability: retains 93.4% of original capacitance after a 180 degree fold 100 times
- Cycling performance: 99.6% of original capacitance after 14,000 cycles

Applications

- Any wired electronics, including:
 - Hybrid and all-electric vehicles
 - Electric trains
 - Heavy machinery
 - Aircraft
 - Spacecraft
 - Defense

Tech Fields

Semiconductors

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

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