Energy Cell with Multi-layer Capacitors

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Sustainable Technologies
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2013 TOP 100 ENTRIES

CER has conceptualized and designed the ultimate miniaturized electric energy storage cell for cell phone charging. When fully charged, it will store approximately 75,000 mAh. Through the 5.0 V micro USB outlet port it will charge an Android™ type cell phone (with a 3,200 mAh battery) approximately 23 times. It will be slightly larger than a typical thumb drive memory (3" long x 7/8" wide x 5/8" thick), weigh about 3 ounces, and can be charged overnight from a household 110-120 AC outlet with a NEMA 1-15, C-7 appliance cord. Expected cycle life is 10,000+ recharges.

The energy cell will utilize an array of multi-layer ceramic capacitors (MLCCs) manufactured from our newly discovered and in development ceramic dielectric capacitor materials that have dielectric constants (K) in excess of one hundred million (10E8). Each MLCC in the array will have an approximate volume of 0.01in3 and a minimum capacitance rating of 5.5 Farads ± 0.5 Farads. An internal charging circuit will convert AC to DC.

With these new capacitors, the energy cell solves many electrical energy storage problems and offers a more efficient and stable energy storage system than either Li-Ion-Polymer batteries or Ultra-Capacitors. This energy cell configuration can be modified to contain more MLCCs, yielding higher mAh ratings. The output circuitry is also adaptable to 20 volts for laptop charging.

The type of configurations and designs are only limited by one's imagination. These new MLCCs can be designed for charging with higher DC voltages resulting in greater power and energy density in a single component.

The new dielectric materials used in the MLCCs will be able to operate from -70°C to +250°C, and do not contain toxic or hazardous chemicals, or electrolytes, like those found in batteries and Ultra-Capacitors. Our energy cell design with the new MLCCs will not be susceptible to fires or leakages as they are all composed of solid state materials.

This new type of energy cell with the advanced capacitor technology will create a paradigm and technology shift in energy storage for EVs, wind turbines, PV modules, as well as all other consumer, industrial and military energy storage requirements.

MANUFACTURABILITY:
This energy cell can be easily manufactured with existing automated assembly methods. Automated assembly equipment will insert and solder the MLCCs and circuitry into the housing, attach the micro USB and the inlet plug, then encapsulate and perform quality control testing. The MLCCs will be produced with standard ceramic processing equipment and manufacturing methods.

MARKETABILITY:
This energy cell will find wide marketplace acceptance due to its greater energy storage capacity, much smaller size, easier portability, safety and recharge cycle life.

COST EFFECTIVENESS:
This energy cell technology will provide a 10X increase in energy storage volumetric efficiencies, performance, reliability and reduce manufacturing costs as compared to Lithium Ion batteries or Ultra-Capacitors. This technology will also eliminate the problem of hazardous materials disposal inherent with batteries. There is a very high market demand for increased energy storage and miniaturization.

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ABOUT THE ENTRANT

Name: Denny Wheeler

Type of entry: individual

Profession: Scientist

Number of times previously entering contest: 1

Denny's favorite design and analysis tools:
Adobe Illustrator, Solidworks

Denny's hobbies and activitiess:
Golf,Fishing,Bowling,Camping, Reading Sci-Fy

Denny belongs to these online communities:
Facebook

Denny is inspired by:
Imagination

Patent status: none

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