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Novel Metal Oxide Aerogel / Graphitic Hybrids for Supercapacitive Energy Storage

Luhrs, Claudia C.

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NOVEL METAL OXIDE AEROGEL / GRAPHITIC HYBRIDS FOR SUPERCAPACITIVE ENERGY STORAGE

Associate Professor Claudia C. Luhrs

Department of Mechanical & Aerospace Engineering
831-656-2568 | ccluhrs@nps.edu

Goal

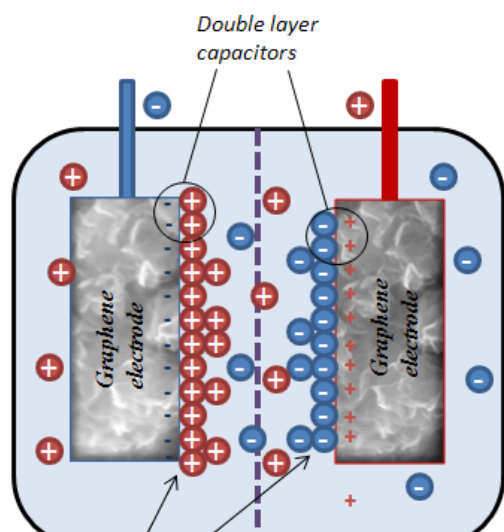
Create the foundation to develop hybrid metal oxide aerogel/graphitic materials for supercapacitor devices, by preserving high surface area, while presenting significantly higher specific capacitance than carbon by itself due to pseudocapacitive effects.

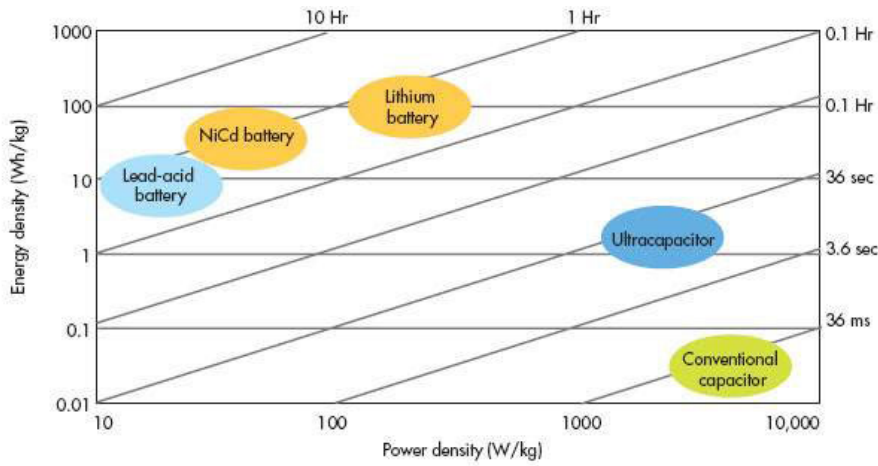
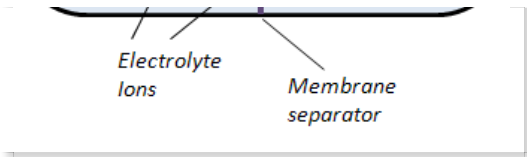
- Electrical double layer capacitors (EDLC), are based on high surface area carbon materials
 - Stores charges physically using two carbon electrodes separated by an intermediate substance
- They present numerous advantages when compared to battery materials:
 - simple charging methods,
 - very fast rates of charge/discharge,
 - low cost,
 - long cycle life and particularly,
 - high power densities.
- Present relative low values of energy density.
- Go beyond the traditional methods to increase capacity
 - Generate a hybrid, including transition metal oxide (ca. MnO₂, WO₃, NiO) and graphitic component to be used in the form of an aerogel.

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A Ragone chart plots storage device energy density versus power density on a log-log coordinate system, with discharge times represented as diagonals. Among other things, it's handy for comparing batteries and ultracapacitors.