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# Charge Storage Device Architecture For Increased Energy And Power Density

Tech ID: 21605 / UC Case 2009-392-0

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## INVENTORS

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## OTHER INFORMATION

### KEYWORDS

chemicals, devices, electrical,  
nanotechnology, process/procedure,  
electrical, energy storage,  
pseudocapacitor, electrochemical  
capacitor

### CATEGORIZED AS

- [Energy](#)
- [Storage/Battery](#)

### RELATED CASES

2009-392-0

SUMMARY

Researchers at UCLA have developed an electrochemical capacitor that provides superior energy and power densities through utilizing nanocrystal porous films that provide high surface area and enhanced ionic motion.

BACKGROUND

Electrochemical capacitors are energy storage devices that provide a high-power and lightweight alternative to rechargeable industrial batteries and backup power supplies. Furthermore, the capacitors exhibit high cycling efficiency, fast recharge capability, and reliable cold temperature performance. However, current electrochemical capacitors are limited by their relatively low energy densities.

INNOVATION

Researchers at UCLA have developed a method that significantly increases the energy density of electrochemical capacitors. High surface area and facile ion motion is attained through fabricating nano-crystalline films with three-dimensionally interconnected porosity. As a result, the charge capacity is increased, without compromising the high charging/discharging rates of electrochemical capacitors.

APPLICATIONS

- ▶ Uninterrupted power supplies
- ▶ Pulse-based communication system, radar, and laser
- ▶ Hybrid electric automobiles

ADVANTAGES

- ▶ High power density
- ▶ High energy density
- ▶ Long cycle life
- ▶ High charging/discharging rates
- ▶ Light weight

STATE OF DEVELOPMENT

Mesoporous nanocrystal-based films have been synthesized and the electrochemical capacitors characterized.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,978,591	05/07/2024	2009-392
United States Of America	Issued Patent	10,741,337	08/11/2020	2009-392
United States Of America	Issued Patent	10,056,199	08/21/2018	2009-392
United States Of America	Issued Patent	9,653,219	05/16/2017	2009-392
United States Of America	Issued Patent	8,675,346	03/18/2014	2009-392

RELATED MATERIALS

- ▶ ["Templated Nanocrystal-Based Porous TiO2 Films for Next-Generation Electrochemical Capacitors," T. Brezesinski, J. Wang, J. Polleux, B. Dunn, S. H. Tolbert J. American Chemical Society \(2009\)](#)

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Cleaning Lithium to Improve Protective Layer](#)
- ▶ [Thermally Insulating Transparent Barrier \(THINNER\) coatings with high transmission, thermal and radiative resistance](#)
- ▶ [Protective Film for Lithium Electrodes](#)

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