International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

Balapur P.O., Hyderabad – 500005, Telangana, India

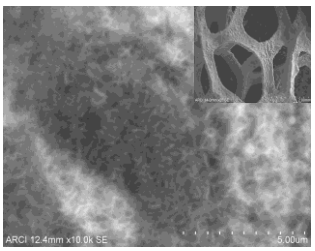
Nanocomposites electrode for hybrid supercapacitor with quick-burst energy release

Overview

For last few decades, the rapid growth in the manufacturing sector for sustainable global economy has increased the demand for energy consumption. The energy generation is mainly relying on conventional energy sources. The depletion of fossil fuels, global warming and environmental-friendly energy sources prompted the development of efficient energy storage and conversion technologies. Now a day, ultracapacitors, a category of energy storage appliance which can bridge the gap between conventional capacitor and electrochemical batteries are widely studied to serve as one of the promising candidate for next generation energy storage devices owing to their exceptional characteristics like high power density, fast charge/discharge process and long cycle life. Among all, nanocarbon materials (carbon nanotubes, graphene, carbon sphere etc) are extremely explored as electrode material due to their intriguing thermal, electrical, mechanical and chemical properties. Our technology demonstrates the development of high performance nanoelectrode for hybrid supercapcitor based on nanoscaled-carbon integrated with electroactive oxide/sulphide and conducting polymers.

Key Features

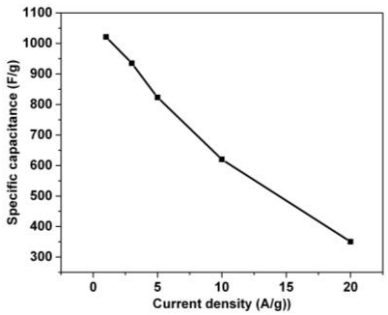
- Facile synthesis of nanoscaled-carbon with surface modification
- Activated porous graphene with tailored pore size distribution
- Shape-tailored metal oxide/sulphide with controllable surface area
- Hybridizing nanocarbon with oxide/sulphide or conducting polymer
- High power density with moderate energy density and multifunctionality
- All-solid-state supercapacitor
- Scalable preparation process



SEM micrograph of mixed metal oxide nanopetals grown on foam

Potential Applications

- Aerospace
- Defence
- Automobiles
- Power grid system
- Consumer electronics
- Tools



Electrochemical characteristics of mixed metal oxide nanopetal grown on foam

Intellectual Property Development Indices (IPDI)

- Nanocomposites for electrode preparation are fabricated
- A prototype all-solid-state supercapacitor is developed
- Development of multifunctional supercapacitor is underway

Status	1	2	3	4	5	6	7	8	9	10

Centre for Carbon Materials (CCM)
ARCI, Balapur PO., Hyderabad 500005, Telangana, India
Tel : +91 40 24452438 / 24452339; Fax : +91 40 24442699
Email: balaji[at] arci [dot] res [dot] in / pkjain [at] arci [dot] res [dot] in / tata [at] arci [dot] res [dot] in