

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

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



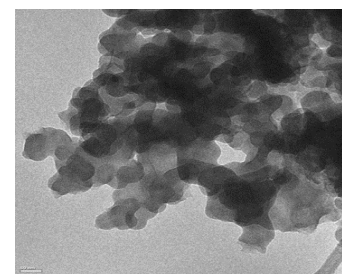
Advanced Carbon materials for Metal-ion Batteries

Overview

Carbonaceous nanomaterials have received a great interest as the anodes for metal-ion batteries (Sodium and Potassium-ion batteries) with regard to their excellent performance in lithium-ion batteries. Despite that, their unique structural properties and abundant availability makes them very interesting materials to enhance the performance of the batteries for large-scale energy storage applications. ARCI is focusing on the development of different types of advanced carbon materials for energy storage applications such as lithium-ion, sodium-ion batteries and Supercapacitors. Mainly exfoliated/expanded graphite (with increased d-spacing) is superior anode material for sodium ion batteries, which allow the sodium ions into intercalation process and metal oxide/ carbon composites are high performance anode materials for metal-ion batteries (Lithium and Sodium).

Key Features

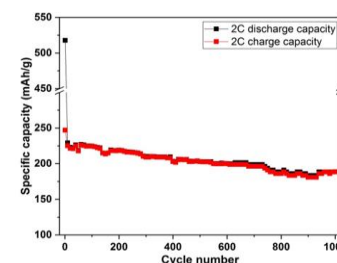
- Development of advanced carbon materials
- Synthesis of Graphene Nano platelets
- Development of metal oxide/carbon composites
- Activated carbon derived from bio-waste for high energy density based supercapacitor
- Carbon soot derived from solid waste



HR-TEM image of solid waste-derived carbon soot

Potential Applications

- Automotive sector
- Portable Electronics
- Grid Storage



Cyclic stability of carbon-soot with lithium at high current rate

Technology Readiness Level (TRL)

- Performance and stability are validated at laboratory scale
- Scale-up and prototype module fabrication underway

IPDI*	1	2	3	4	5	6	7	8	9	10
Activities	Basic concepts and understanding of underlying scientific principles	Short listing possible applications	Research to prove technical feasibility for targeted application	Coupon level testing in simulated conditions	Check repeatability/consistency at coupon level	Prototype testing in real-life conditions	Check repeatability/consistency at prototype level	Reassessing feasibility (IP, competition technology, commercial)	Initiate technology transfer	Support in stabilizing production
Status	[Green bar indicating current TRL level]									

*IPDI : Intellectual Property Development Indices

Major Patents / Publications

Centre for Carbon Materials (CCM)

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2. The percentage for technology readiness level may be given strictly based on the indicators provided. In case of difficulty in shading (blue) the row in the table for 45%, 55% etc., it will be taken care at my end.
3. The format for address at the bottom of page
 - a. Name of the Centre
 - b. Address of ARCI
 - c. Telephone number format : Concerned Scientist/s followed by Team Leader's telephone number
 - d. Email id format:
Concerned Scientist/s, Team Leader and concerned Associate Director's email id.
4. The content should not exceed one page.
5. Only two images to be provided –(microstructure, product, graph or specific facility)