

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

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Development of Lithium-ion Batteries for Electric Vehicle Application

Overview

Due to the depletion of the fossil energy reserves as well as alarming level of greenhouse gas emission triggered to look out for alternative clean energy sources, especially for automotive sector. The key challenge for electric vehicles is to get suitable battery to store the required amount of energy in a given volume for long driving range and speed. Lithium-ion battery (LIB) has been proven to be next generation technology to alleviate these problems. However, currently there are no manufacturers of these batteries in India. ARCI has undertaken a major task to developed LIB technology for electric vehicles by setting up a pilot plant facility for manufacturing of Lithium-ion cells and battery packs for automotive application. The objective is to establish the LIB technology using standard materials and demonstrate off-line/on-board vehicle testing. In addition high voltage/new materials will be developed indigenously. The promising materials will be optimized and scale-up for process technology. Then LIB cell/module/ pack will be fabricated using the in-house materials and its electrochemical performances will be evaluated. Currently CAEM has developed assorted configurations of prototype lithium-ion cells/modules using LiFePO_4 /Graphite chemistry and their cyclic and rate capability performances have been tested.

Key Features

- High energy and power density, ate capability , good cycle & calendar life , low self-discharge
- Good performance in wide temperature range
- Assorted cell types can be fabricated (Cylindrical, prismatic and pouch type)
- New high energy electrode materials can easily be implemented in LIB fabrication line

10 Ah Prismatic type prototype cell



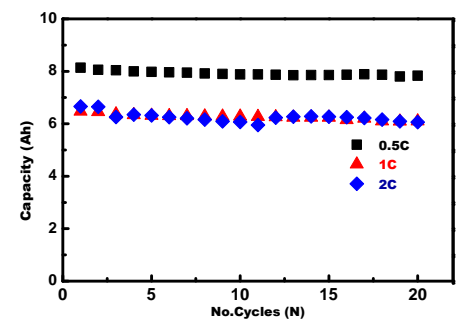
Potential Applications

- Two, three and four wheeler electric vehicles
- Stationary energy storage applications
- UPS

Intellectual Property Development Indices (IPDI)

- Prototype cells have been fabricated and electrochemical performance has been tested
- Assembly and testing of large format battery module/pack are in progress

Performance of prototype 10 Ah Cell



Status	1	2	3	4	5	6	7	8	9	10

Major Publications

1. Nano batteries: Future of automotive transportation, T. N. Rao and R. Prakash, Nano digest, 2013, 4, 28-31.
2. Microstructure and mechanical properties of pulse laser welded SS and Al Alloys for lithium-Ion cell casings, V. Rao Rikka, S. R, Sahu, R. Tadepalli, R. Bathe, T. Mohan, R. Prakash, G. Padmanabham and R. Gopalan Journal of Materials Science and Engineering, accepted.

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