+44 20 8123 2220
info@marketpublishers.com

Large-Format Rechargeable Lithium-Ion Batteries For Electric Energy Storage In Transport - Types, Applications, New Developments, Industry Structure And Global Markets

https://marketpublishers.com/r/L6CAD7EC48EEN.html
Date: July 2009
Pages: 132
Price: US$ 3,250.00 (Single User License)
ID: L6CAD7EC48EEN

Abstracts

Print Copy - US$2,950.00
Single User License - US$3,250.00
Multi-User License at the Same Location- US$3,950.00
Enterprise License -US$4,950.00

Large format, rechargeable lithium batteries are constructed from many lithium cells. These cells are typically connected together electrically to form what is commonly referred to as a “battery module.” Modules are then connected together electrically to form a “battery assembly.” Cells are used to construct modules which meet the definition of a “battery,” subject to testing requirements which include U.S., European and Japanese standards and one internationally accepted standard, the U.N. testing requirements.

With increasing size, battery manufacturers face dramatically increasing costs and testing complexities. The benefit of such extensive testing of assemblies is the guarantee that the Li-ion batteries will last – with unimpaired functionality, power and safety – for the required ten years or 160,000km to 240,000km.

Using Li-ion technology in vehicles poses particular challenges. The battery has to operate safely and reliably for the whole of the life cycle stipulated by the vehicle manufacturer, which is at least ten years. This is achieved by an elaborate battery management system which monitors the battery so that it is always within the optimum working range. The electronics compare the battery's overall condition, temperature and energy reserves against its age. Safety circuits prevent the energy storage unit from

becoming too hot. A cell supervision circuit (CSC) monitors the individual cells and ensures their optimum interaction. So that cells are not permanently subjected to uneven loads, the CSC balances the charge levels of all the cells in the battery.

Although, Pb-acid and nickel metal hydride (NiMH) batteries still control the transport energy storage batteries, lithium-ion batteries are currently emerging as an alternative source. These batteries not only come in a smaller and lighter package, but also provide twice the available power and twice the available energy density of the incumbent NiMH technologies. The efficiency that stems from the power and energy density solutions of lithium-ion chemistry is enabling a new generation of hybrid and electric vehicles that are more powerful and more energy efficient than ever before.

This iRAP report focuses on large format, high performance, rechargeable lithium batteries and their potential use in plug-in hybrid electric vehicles (PHEVs), hybrid electric vehicles (HEVs), electric vehicles (EVs), light electric vehicles (LEVs) and heavy duty hybrid vehicles (HHEVs) which are the next great transportation advance that will move us into a cleaner, cheaper, and more oil-independent future.

STUDY GOAL AND OBJECTIVES

Sharp competition and legislation are pushing development of hybrid drive trains. Based on conventional internal combustion engine (ICE) vehicles, these drive trains offer a wide range of benefits, from reduced fuel consumption and emission to multifaceted performance improvements. The battery is the key component for all hybrid drive trains, as it dominates cost and performance issues. The selection of the right battery technology for the specific automotive application is an important task which impacts on costs of development and use. Safety, power, and high cycle life are a must for all hybrid applications.

The greatest pressure to reduce cost is in soft hybrids, where lead-acid batteries present the cheapest solution, with a considerable improvement in performance needed. From mild to full hybridization, an improvement in specific power makes higher costs more acceptable, provided that the battery's service life is equivalent to the vehicle's lifetime. Today, this is proven for the nickel–metal hydride system (NiMH system). Lithium-ion batteries, which make use of a multiple safety concept, with further development anticipated, provide even better prospects in terms of performance and costs. Also, their scalability permits application in battery electric vehicles – the basis for better performance and enhanced user acceptance.

The next generation of large format, rechargeable, lithium-ion batteries has improved safety characteristics in part through the use of alternative, nanosized materials, particularly phosphates. Traditional Li-ion technology uses active materials with particles that range in size from 5 microns to 20 microns.

This report identifies the trends and strategies driving large format, rechargeable lithium battery market segments, and focuses on detailed market share data and quantification in transport applications including:

- electric vehicles/plug-in hybrid electric vehicles (PHEVs);
- light duty (passenger vehicles);
- medium duty (trucks, etc.);
- heavy duty (heavy equipment).

Non-road electric vehicles include:

- fork lifts, material handling equipment, personnel carriers and cleaners;
- airport ground support equipment (GSE) – (electrification of ground support equipment at airports).

Electric idling initiatives (substituting electrification for petroleum-fueled idling operations) include:

- "cold ironing" - cruise ship and cargo terminals;
- locomotive electric idling;
- truck stop electrification.

This study provides market data about the size and growth of the battery application segments, new developments including a detailed patent analysis, company profiles and industry trends. The goal of this report is to provide a detailed and comprehensive multi-client study of the market in North America, Europe, Japan, China, India, Korea and the rest of the world (ROW) for large format rechargeable lithium batteries, and potential business opportunities in the future.

The objectives include thorough coverage of the underlying economic issues driving the large format, rechargeable lithium battery, as well as assessments of new advanced nano-enabled battery that are being developed. Another important objective is to provide realistic market data and forecasts for large format, lithium battery usage. The study provides the most thorough and up-to-date assessment that can be found anywhere on the subject. The study also provides extensive quantification of the many important facets of market developments in large format, rechargeable lithium batteries all over the world. This, in turn, contributes to the determination of strategic responses companies may adopt in order to compete in this dynamic market.

REASONS FOR DOING THE STUDY

Demand for battery solutions is being driven by a need to reduce dependence on oil, as well as growing concern about vehicle emissions. From 13 hybrid models in 2008, the market is expected to grow to nearly 75 hybrid models in 2014. In addition to the automobile market, applications for lithium-ion (Li-ion) battery technology include medical, military, aerospace, electric utility and other growing markets. Advanced lithium-ion battery technology is a basic need for every automaker in the world today, and it will grow steadily. Practically all major original equipment manufacturers (OEMs) are working on a Li-ion battery.

The transition period from the petro-car to the electric car will feature an interesting horse race between the Li-ion battery and an upgraded nickel metal hydride (NiMH) battery. Presently, hybrid electric vehicles (HEV) typically use batteries based on NiMH technology, which use simple control circuits but are heavier and operate at lower voltages. Li-ion batteries, widely used in portable consumer electronic equipment, offer a solid energy-to-weight ratio at more than twice that of NiMH batteries, with a very low self-discharge while not in use. However, their use in higher power applications has so far been limited because the charge/discharge cycle of Li-ion batteries must be carefully managed to protect the batteries from abuse conditions.

Further, the anticipated growth of plug-in hybrid electric vehicles (PHEVs) and rising

costs of traditional transportation fuels have accelerated the development of large format, rechargeable lithium batteries technology. Today, developers of advanced batteries are focusing on electric vehicles as a key target application, with variations based on the chemistry selected and other key factors such as the size of the system or the amount of energy it will store.

Worldwide, Li-ion research and development expenditures are about $1 billion per year, which may drive the price of the technology lower, which will cause steady growth rate in the large format, rechargeable, lithium battery industry. OEMs of PHEVs require longer run times and slower drain rates, higher capacity at lower prices, and increasingly enhanced power capabilities. Technologically, it is a mature market. The most difficult hurdle for PHEVs is the battery. The goals for a PHEV battery are compact size, high energy, large storage capacity, and the ability to support both deep and shallow discharge cycles. With today's technology, a battery that is powerful and durable enough to power a PHEV's motor takes up more space than many vehicle makers or consumers are willing to sacri?ce. Fortunately, with quickly evolving battery technologies, these issues are likely to diminish.

With all these developments, iRAP felt the need to conduct thorough technology, industry and market analyses of lithium-ion batteries.

CONTRIBUTIONS OF THE STUDY

Current battery technologies are limited, making plug-in hybrid or all-electric cars prohibitively costly and insufficient to meet consumer demands. Long-term, fundamental research in electrical energy storage will be needed to accelerate the pace of scientific discoveries and to see transformational advances that bridge the gaps in cost and performance, separating the current technologies and those required for future utility and transportation needs.

This report analyzes the worldwide markets for large format, rechargeable lithium batteries already using lithium manganese oxide, lithium iron phosphates, titanium oxide, silicon/graphite composites, and lithium polymer, related to transport electric energy storage applications such as plug-in hybrid electric vehicles (PHEVs), hybrid electric vehicles (HEVs), electric vehicles (EVs), light electric vehicles (LEVs) and heavy duty hybrid electric vehicles (HHEVs).

The report provides the most thorough and up-to-date assessment that can be found anywhere on the subject. The study also provides extensive quantification of the many

important facets of market developments in the emerging markets of large format, rechargeable lithium batteries, for example, in high power density and high energy density electric energy source. This, in turn, contributes to the determination of what kind of strategic response suppliers may adopt in order to compete in this dynamic market.

SCOPE AND FORMAT

The market data contained in this report quantifies opportunities for large format, rechargeable lithium batteries. In addition to product types, it also covers the many issues concerning the merits and future prospects of the large format lithium battery business, including corporate strategies and the means for providing these highly advanced products and service offerings. It also covers, in detail, the economic and technological issues regarded by many as critical to the industry's current state of change.

The report provides separate comprehensive analyses for the U.S., Japan, western Europe, China, Korea, and the rest of the world. Annual forecasts are provided for each region for the period 2009 through 2014. Cost analysis of large-format lithium-ion batteries, analysis of global patent activity, and market competition and dynamics in the new technology are also targeted in the report. The report profiles 30 companies, including many key and niche players worldwide, as technology providers, raw material suppliers and large-format battery assemblers.

TO WHOM THE STUDY CATERS

The study would benefit existing OEMs supplying or intending to supply to manufacturers of hybrid vehicles, PHEVs, EVs, LEV, and HHEVs who are looking for vehicle batteries which require longer run times and slower drain rates, higher capacity at lower prices, and increasingly enhanced power capabilities. Large format, rechargeable, lithium batteries are specifically engineered as a power battery able to supply short burst of electrical energy, as opposed to an energy battery designed for longer, slower power drains found in an electric car. This makes them ideal for use in hybrid-electric cars as well as other applications, including lawn care and garden equipment.

This study provides a technical overview of the large format, rechargeable, lithium-ion batteries, especially recent technology developments and existing barriers. Therefore, audiences for this study include marketing executives, business unit managers and

other decision-makers in the market, as well as those in companies peripheral to this business.

The report also analyzes the strategies and prospects of leading firms active in this space. It will be of interest to:

- firms in the battery and power spaces who want to understand the next wave of opportunities and how the new battery and fuel cell technology will impact them in the future;
- advanced materials, components and sub-contract manufacturing companies who need to analyze the potential for selling their products and services into the large format, rechargeable, lithium-ion battery power segment;
- investment bankers, venture capitalists and private equity investors who need a realistic appraisal of the revenue potential and timeframes associated with the advanced energy storage technologies based on nanostructured materials.

REPORT SUMMARY

Low-cost, long-life lithium batteries are seen as essential for accelerated development of alternative power vehicles, ranging from the now familiar gasoline-electric hybrids that double normal fuel economy to hydrogen fuel cell vehicles that use no petroleum.

Efficient energy storage systems for hybrid drives will acquire increasing significance in the future. It is precisely storage systems such as lithium-ion technology that will greatly affect the performance and costs of hybrid vehicles, plug-in hybrids and electric vehicles. Preferably, small and light systems with a simultaneously high capacity for charging and discharging are required. Besides increasing the performance, the development work centers on the service life of the battery systems in various drive cycles and temperature ranges.

Plug-in hybrid electric vehicles (PHEVs) and electric cars need more robust lithium batteries than conventional hybrids, because the batteries undergo a more severe duty cycle, charged to the brim and then nearly drained. Today’s large-format, rechargeable lithium batteries have a modular embedded micro-controller battery management system (BMS), with thousands of lithium cells connected in-loop to take care of

proprietary safety, state-of-charge, state-of-health, balancing and diagnostics algorithms, which together serve to maximize the utility and reliability of systems solutions. They also have a variety of available communications interfaces (CAN, J1939, RS-232, etc.) to facilitate the seamless integration of the battery into the vehicle system.

Major findings of this report are:

> The 2009 market was estimated to be about $80 million. In 2009, we estimate the market to be flat or going down slightly, to $77 million. In spite of the recession, iRAP estimates the market to reach $332 million in 2014, for an average annual growth rate (AAGR) of 33.9%. Midway through the projection period, it is estimated that Li-ion batteries for HEVs, PHEVs and EVs will be in wider use, thereby providing a large growth rate.
>
> Customized batteries for off-road vehicles and industrial vehicles such as electric fork lifts, golf carts and motorized wheel chairs, will have highest market share, reaching 51.9% of the market in 2009; by 2014, this share will decrease to 15%. In 2014, large-format lithium batteries for HEVs, PHEVs and EVs will have a 26.6% share of the global market, at $88 million.

+44 20 8123 2220
info@marketpublishers.com

Contents

APPLICATIONS

INDUSTRY STRUCTURE

GLOBAL MARKET AND REGIONAL MARKET SHARES

PATENTS AND PATENT ANALYSIS

Nanocomposites
Synthesis of Metal Phosphates
Electrodes Comprising Mixed Active Particles
Particulate Electrode Including Electrolyte for a Rechargeable Lithium Battery
Circuits, Apparatus, Electrochemical Device Charging Methods, and Lithium-Mixed Metal Electrode Cell Charging Methods
Secondary Battery Electrode Active Materials and Methods for Making the Same
Oligo Phosphate-Based Electrode Active Materials and Methods of Making Same
Lithium-Based Active Materials and Preparation Thereof
Process for Making Nanosized Stabilized Zirconia
Lithium Secondary Battery and Positive Electrode for the Same
Method for Producing Mixed Oxides and Mmetal Oxide Compounds
Methods of Making, Positioning and Orienting Nanostructures, Nanostructure Arrays and Nanostructure Devices
Methods of Making Lithium Metal Cathode Active Materials
Method of Manufacturing Nanosized Lithium-Cobalt Oxides By Flame Spraying Pyrolysis
Positive Electrode Active Material for Secondary Battery and Non-Aqueous Electrolyte Secondary Battery Comprising the Same
Lithium-Containing Phosphate Active Materials
Process for Making Lithium Titanate
Lithium-Based Active Materials and Preparation Thereof
Process for Making Nanosized and Sub-Micron-Sized Lithium-Transition Metal Oxide
Stochastic Assembly of Sublithographic Nanoscale Interfaces
Methods of Positioning And/Or Orienting Nanostructures
Stabilized Electrochemical Cell Active Material
Salts of Alkali Metals of N, N’ Distributed Amides of Alkane Sulfinic Acid and Non-Aqueous Electrolytes On Their Basis
Lithium Metal Fluorophosphate Materials and Preparation Thereof
Lithium Secondary Battery
Particulate Electrode Including Phosphates and Related Electrode Active Materials
Alkali Transition Metal Phosphates and Electrode Active Materials
Power Supply Apparatus and Power Supply Operational Methods
Electrical Power Source Apparatus, Circuits, Electrochemical Device Charging Methods
Alkali Metal Hydrogen Phosphates As Precursor for Phosphate-Containing Electrochemical Active Materials
Non-Aqueous Electrolyte Secondary Cell
Negative Electrode for Rechargeable Battery

WO/2007/050109 – Lithium Battery Mangement System
WO/2008/045455 – Lithium Battery System
WO/2008/082111- Middle- Or Large-Sized Battery Pack Case Providing Improved Distribution Uniformity in Coolant Flux
Us20070124980a1 – Cartridge for Middle- Or Large-Sized Battery Pack
Ep20060126328 – Battery Management System and Method
Ep20060026101 - Battery Management System

COMPANY PROFILES

A123SYSTEMS
Advanced Battery Technologies, Inc. (ABAT)
Altair Nanotechnologies
Thunder Sky Battery Limited
Toshiba Battery Co., Ltd.
Valence Technology Inc

APPENDIX I

Table 24 Battery-Powered Electric Vehicles Demonstrated Or Announced By Oems Using Large-Format Rechargeable Lithium Batteries

+44 20 8123 2220
info@marketpublishers.com

I would like to order

Product name: Large-Format Rechargeable Lithium-Ion Batteries For Electric Energy Storage In Transport - Types, Applications, New Developments, Industry Structure And Global Markets

Product link: https://marketpublishers.com/r/L6CAD7EC48EEN.html

Price: US$ 3,250.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:
info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page https://marketpublishers.com/r/L6CAD7EC48EEN.html

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:
Last name:
Email:
Company:
Address:
City:
Zip code:
Country:
Tel:
Fax:
Your message:

**All fields are required

Custumer signature _____

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at https://marketpublishers.com/docs/terms.html

To place an order via fax simply print this form, fill in the information below

+44 20 8123 2220
info@marketpublishers.com

and fax the completed form to +44 20 7900 3970