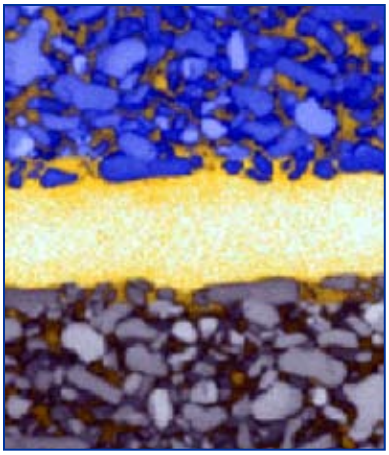

Battery & Fuel Cell Materials

US Industry Study with Forecasts for **2011 & 2016**

Study #2244 | October 2007 | $4400 | 245 pages

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The Freedonia Group

767 Beta Drive

Cleveland, OH • 44143-2326 • USA

Toll Free US Tel: 800.927.5900 or +1 440.684.9600

Fax: +1 440.646.0484

E-mail: info@freedoniagroup.com

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Battery & Fuel Cell Materials

US Industry Study with Forecasts for ***2011 & 2016***

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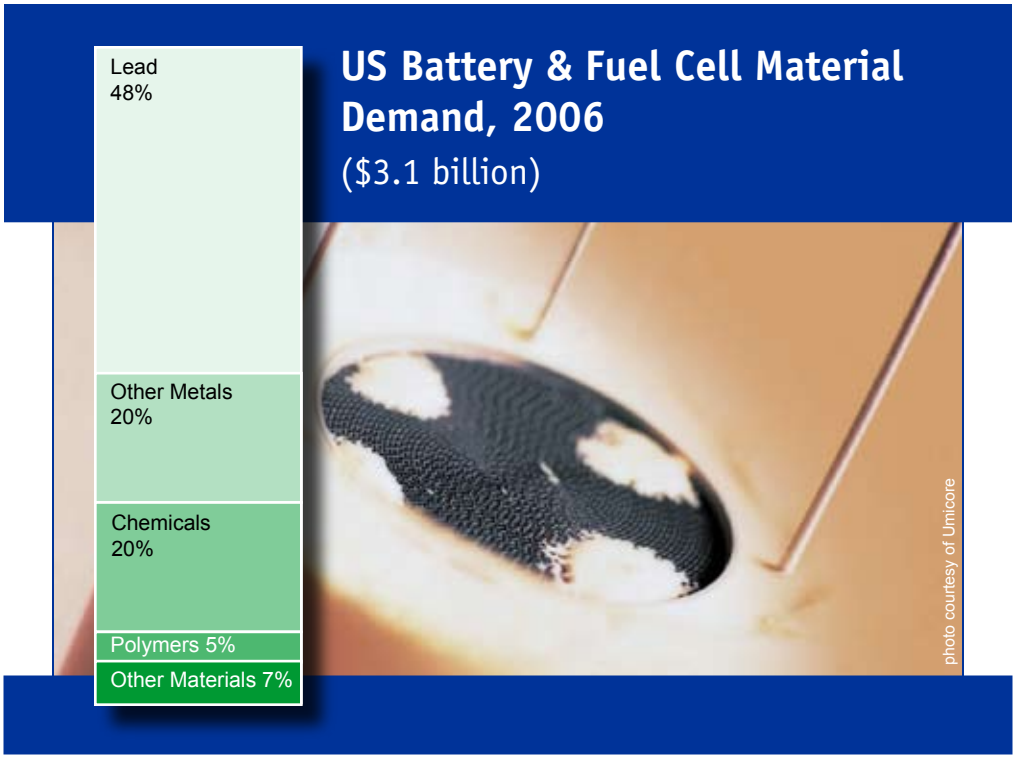
Increasing production of high-performance batteries and rapidly emerging commercial success for fuel cells will energize US demand for battery and fuel cell materials through 2011.

US demand to grow 4.4% annually through 2011

US demand for materials used in the production of batteries and fuel cells will rise 4.4 percent per year to $3.8 billion in 2011. Gains will be driven by increasing production of high-performance battery products, especially lithium and nickel metal hydride (Ni-MH) types, due to the enormous popularity of high-drain portable electronic devices. Additionally, demand for fuel cell materials will rise nearly fivefold from a small base, as fuel cell products begin to enjoy commercial success.

Polymers, carbon/graphite to be fastest growing types

Metals will continue to be the leading material type in batteries and fuel cells through 2011. Metal prices spiked during the 2001-2006 period, spurring strong value gains for metals in batteries and fuel cells. However, advances through 2011 will be restrained by an expected moderation in metal prices and sluggish demand in the sizeable lead metal market. More rapid growth will be seen for polymers and carbon/graphite materials, which are used in fast-growing lithium and Ni-MH battery chemistries as well as fuel cells. Gains in demand for other materials will also be strong, especially fumed silica and glass fibers used in valve-regulated lead-acid batteries, as well as ceramics in solid oxide fuel cells.



Performance additives, catalysts to pace functions

Among functional categories for battery and fuel cell materials, the most rapid gains will be for performance additive and catalyst materials, which are expected to nearly double through 2011. Growth will be driven by the ongoing need to improve battery performance and durability, as well as by surging demand for fuel cells, which use expensive platinum catalysts. Active materials and electrodes are the leading outlet for materials, constituting over half of demand in 2006, but will experience below-average increases in demand. Battery containers and current collectors will show similarly slow growth, with value gains restrained by a moderation in metal prices and increasing cost reduction efforts.

Primary batteries, fuel cells best market prospects

Secondary batteries accounted for nearly 70 percent of battery and fuel cell material demand in 2006, due to the size of the lead-acid battery market. However, faster gains are forecast for materials in primary batteries, fueled by a robust increase in primarily lithium battery shipments and continued strength in the bedrock alkaline battery market. Stellar growth is expected for fuel cell materials, which will capture seven percent of the market in 2011.

Battery & Fuel Cell Materials

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Sample Text, Table & Chart

TABLE V-1

FUEL CELL MATERIALS DEMAND BY TYPE
(million dollars)

Item	1996	2001	2006	2011	2016
Fuel Cell Shipments					
$ materials/000$ shpts					
Fuel Cell Materials Demand					
Metals					
Polymers					
Carbon/Graphite					
Ceramics					
Chemicals & Other					
% fuel cell					
Battery & Fuel Cell Materials Demand 1					

SAMPLE TABLE

BATTERY MATERIALS

Carbon/Graphite

Consumption of carbon materials (which include acetyl
carbon black, carbon fibers, ry pr
forecast to increase 3.7 perc o $10
Advances will represent a si gain
during the 1996-2006 perio rp de
the output of zinc-carbon ba 06, zi
batteries accounted for over te de
batteries. By 2006, that shar perc
expected to decline to three percent in 2016. However, healt
in alkaline and primary lithium battery output will offset these declines, stimulating demand through the forecast period.

SAMPLE TEXT

Over the longer term, use of nanotechnology and innovative cell designs could further improve battery performance, contributing to additional market gains for carbon graphite materials. For example, Firefly Energy is working to develop carbon foam current collector plates for lead-acid batteries that would replace the traditional lead grids. Carbon foam offers numerous advantages over lead grids, including lighter weight, greater surface area, and longer battery life through increased resistance to corrosion. In May 2007, Firefly Energy announced that it was partnering with lead-acid battery supplier Crown Battery for commercial production of batteries using Firefly's carbon grid technology.

Carbon/graphite materials (in the form of fibers, foams, powders and solids) have numerous applications in the battery industry, including use as active materials (Li-Ion cells), current collectors (zinc-carbon cells), additives to increase conductivity (alkaline, primary lithium) and battery can coatings. In most market segments, demand is increasing for higher purity and fine grain formulations that can help boost battery performance, although in lower-end applications graphite is being replaced by carbon black because the latter is less expensive. New processing

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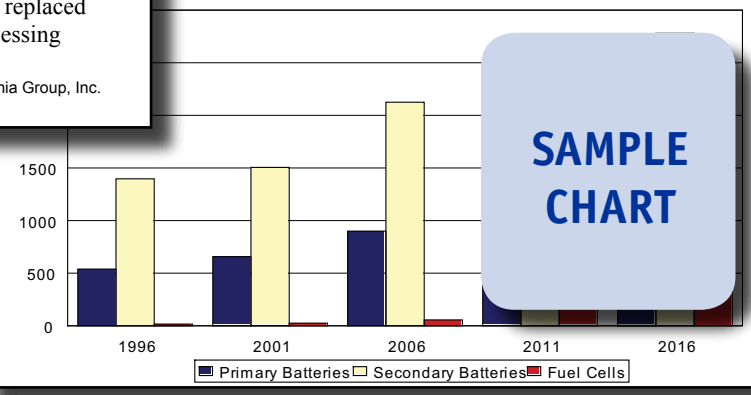
CHART III-3

BATTERY & FUEL CELL MATERIALS
DEMAND BY APPLICATION, 1996-2016
(million dollars)



SAMPLE CHART

Battery & Fuel Cell Materials

US Industry Study with Forecasts for ***2011 & 2016***

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Sample Profile, Table & Forecast

TABLE IV-23

ALKALINE BATTERY MATERIALS DEMAND
(million dollars)

Item	1996	2001	2006	2011	2016
Alkaline Battery Shipments	20				60
$ materials/000$ shpts					7
Alkaline Battery Materials Demand					0
By Type:					
Metals					0
Zinc					0
Steel					5
Brass & Other					5
Chemicals					5
Manganese					5
Other					0
Polymers					3
Carbon/Graphite					0
Other					2
By Function:					
Active Materials					5
Current Collectors					4
Containers					2
Performance Additives					1
Separators, Electrolytes & Other					8
% alkaline	6				4
Primary Battery Materials Demand	5				400

SAMPLE TABLE

COMPANY PROFILES

OM Group Incorporated
127 Public Square
1500 Key Tower
Cleveland, OH 44114
216-781-
http://wv

Sales: $
US Sale
Employ

Key Pro , and
sors and

SAMPLE PROFILE

OM Group (OMG) is a vertically integrated produc keter of metal-based specialty chemicals and materials. does business through three product groups: Inorganics, Organics and Electronic Chemicals. In March 2007, OM nickel business to Norilsk Nickel (Russia) for $408 milli operates manufacturing facilities in the Americas, Europe, Africa and the Asia/Pacific region.

The Company is active in the US battery and fuel cell materials industry through the Inorganics product group, which had 2006 sales of $419 million. The group primarily manufactures cobalt and germanium inorganic products for a range of applications, including batteries. In 2006, 48 percent, or approximately $200 million, of the product group's total sales were for battery applications.

OMG's inorganic products for the battery industry include cobalt raw materials and precursors, and nickel-based precursors and chemicals. Cobalt raw materials consist of battery-grade powders, which are

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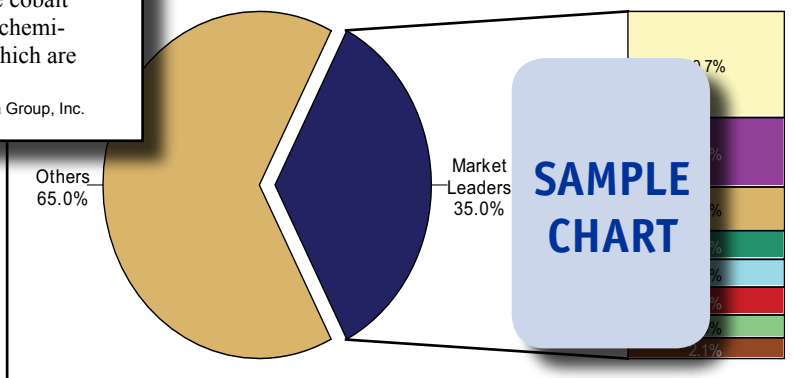
CHART VI-1

ERY & FUEL CELL MATERIALS MARKET SHARE, 2006
($3.1 billion)



SAMPLE CHART

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Other Studies

World Nanomaterials

The global market for nanomaterials will reach $4.2 billion by 2011 and remain concentrated in the US, Western Europe and Japan. Products making the greatest initial commercial impact are nanoscale versions of conventional materials such as silica, titanium dioxide, alumina, iron oxide, and zinc oxide. This study analyzes the $1 billion global nanomaterials industry, with forecasts for 2011, 2016 and 2025 by product, market, world region and for 15 countries. It also discusses R&D and profiles major participants.

#2215 ..... 08/2007 ..... $5500

World Fuel Cells

Global fuel cell spending (R&D, investment, sales) will grow 15% yearly through 2011. Portable electronics will be the fastest growing commercial use while electric power generation will stay the largest. Proton-exchange membrane fuel cells will remain dominant over other chemistries. This study analyzes the $5.2 billion world fuel cell industry to 2011 and 2016 by product, chemistry, application, world region and for 14 countries. It also reviews technology, evaluates market share and profiles major players.

#2194 ..... 05/2007 ..... $5500

Industrial Crystals

US industrial crystal demand will grow 5.8% yearly through 2011, led by uses in nonlinear optical materials and compound semiconductor substrates. Communications and security/defense will see the largest market gains. Transition metal-based crystals and semiconducting types will be the fastest growing materials. This study analyzes the $845 million US industrial crystal industry, with forecasts for 2011 and 2016 by material, application and market. It also evaluates market share and profiles leading players.

#2166 ..... 05/2007 ..... $4500

Batteries

US demand for primary and secondary batteries will grow 4.3% annually through 2011. Growth will be driven by strong demand for battery-powered products and motor vehicles, and by an ongoing shift toward more expensive, better-performing batteries. Primary batteries will outpace secondary/rechargeable types, led by primary lithium batteries. This study analyzes the $12.1 billion US batteries industry to 2011 and 2016 by product and market. It also evaluates market share and profiles major producers.

#2178 ..... 03/2007 ..... $4500

Batteries in China

Demand for batteries in China will grow 13.2% annually through 2010. Gains will be driven by the emergence of electric bicycles and strong domestic consumer demand for battery-powered products. Alkaline and lithium batteries will be the fastest growing primary type while rechargeable lithium batteries will pace the secondary battery segment. This study analyzes the ¥59 billion Chinese battery industry to 2010 and 2015 by product and market. It also evaluates market share and profiles leading competitors.

#2151 ..... 02/2007 ..... $4900

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