

**Direct Methanol Fuel Cell (DMFC) Market Shares,
Strategies, and Forecasts, Worldwide, Nanotechnology,
2010 to 2016**

**Direct Methanol Fuel Cells (DMFC): New Technology
Improves Functionality and Drives Lowering Costs**



Picture by Susie Eustis

MOUNTAINS OF OPPORTUNITY

**WinterGreen Research, Inc.
Lexington, Massachusetts**

www.wintergreenresearch.com

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CHECK OUT THESE KEY TOPICS

DMFC

**Nanotechnology Catalysts
Direct Methanol Fuel Cell
DMFC Cellphone Charging
DMFC Peripheral Charging
DMFC Catalysts
Laptops, Misc. Gadgets
Samsung Military Fuel Cell
DMFC Fuel Cell Prototypes
Methanol-Powered Dock
Power A Laptop For A Month
DMFC (Direct Methanol Fuel Cell
Activated Carbon
NaOH
Chemical Activation
Pore size Distribution
DirectMethanolFuelCell
DMFC Portable Power
Laptop Fuel Cell
Cell Phone Fuel Cell
Broadband Fuel Cell
FuelCell
DMFC Portable Power**

Nanotechnology in Fuel Cells

**DMFC Proves More Reliable Than Liquid Hydrogen Fuel Cells
Portable Power Applications of DMFC
Active And Passive DMFC**

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Direct Methanol Fuel Cell (DMFC) Market Shares, Strategy, and Forecasts, Worldwide, Nanotechnology, 2010-2016

LEXINGTON, Massachusetts (October 22, 2010) – WinterGreen Research announces that it has a new study on Direct Methanol Fuel Cell Market Strategy, Market Shares, and Market Forecasts. The 2010 study has 279 pages, 66 tables and figures. Worldwide markets are poised to achieve significant growth as a new generation of portable electronics has need for longer power on times. DMFC is positioned to provide longer power on times with rapid refill of charging liquid. Units are expected to reach cost parity with thin film batteries by the end of the forecast period. Demand for more portable electricity is coming with the increased use of broadband cell phones, laptop computers, and tablet PCs.

According to Susan Eustis, the lead author of the study, “the use of DMFC is a breakthrough for portable energy delivery. Throughout the forecast period DMFC miniature fuel cells are expected to be able to enable consumers to talk for up to a month continuously on a cellular phone without recharging.” Fuel cells change the telecommuting world, powering laptops and digital handheld devices. Personal digital devices work for hours. DMFCs run longer than batteries. The fuel is abundant and available.

The single largest direct-methanol fuel cell (DMFCs) market driving force is that devices can be used in airplanes. Approvals came after safety standards were in place. The International Civil Aviation Organization and the US Department of Transportation have allowed methanol fuel cells and their cartridges to be carried in the passenger cabin of airplanes.

This means air travels will start to buy them. The convenience and the longer life for power is a compelling advantage. To keep an executive, manager, or service person working while traveling provides an increase in productivity. Software engineers can work more productively while commuting.

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DMFC is a subset of the proton exchange membrane (PEM) fuel cell technology. The direct methanol fuel cell or DMFC is emerging as a significant energy source for some cell phone and laptop applications. DMFC emergence is viable in the portable device sector. Commercialization is driven by consumer demands and desires for a power source that can operate alone or as a supplement synergistically with existing advanced battery technologies.

DMFC technology is used to power consumer-portable devices. Applications are achieved through continuing research and innovation. Micro fuel cells are being developed. These are showing efficiency rates close to 40 percent.

Methanol is the type of material used in the fuel cell stack to generate the chemical reaction (electrolyte) needed to make electricity. DMFC fuel cells emit fewer pollutants than other forms of energy generation, they have the potential to use 50 % less energy than internal combustion engines and 30 % less energy than conventional gas-fired power plants.

Nanotechnology improves fuel cells. Nanotechnology is used for making fuel cell catalysts. Catalysts are used with fuels such as hydrogen or methanol to produce hydrogen ions. Platinum, which is very expensive, is the catalyst typically used in this process. Companies are using nanoparticles of platinum to reduce the amount of platinum needed, or using nanoparticles of other materials to replace platinum entirely and thereby lower costs.

Nanotechnology is providing significant breakthroughs in catalysts that provide improvements in capability. Through extensive catalyst development and use of superior membrane materials, QuantumSphere has developed MEA technology that allows the direct methanol fuel cell to operate with up to 10X higher methanol fuel concentrations, without a sacrifice in power, which can directly lead to as much as a ten times reduction in size and weight of the fuel tank.

QSI's catalyst solution uses lower cost metals, engineered at the nano scale, to replace platinum. Palladium is one example, as it resembles platinum chemically, is extracted from copper-nickel ore, and is already used as a catalyst material in the catalytic converters of automobiles. Palladium is also about 70% less expensive than platinum, and when used at the nano scale in direct methanol fuel cells, it has demonstrated an increased power density of 45%.

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Fuel cells run on methanol, an inexpensive alcohol used in windshield wiper fluid. This DMFC market has as the earliest adapters users of laptop computers, particularly for the military. These users are dependent on mobile electronics.

Electronics needs to operate in the field for long times and needs rapid recharging. Military applications, enhanced cell phones and other hand held devices lead adoption of DMFCs into the consumer markets.

Small portable devices are well suited, in terms of storage, safety, and energy density, to use of methanol as a fuel for fuel cells. Direct hydrogen feed for fuel cells requires complicated storage and would take much more space in small portable devices. There is also the safety issue of compressed hydrogen being allowed on airplanes. Cartridges of methanol can fit into existing retail channels or be available from OEMs. Methanol cartridges could be available through any number of delivery channels and accepted without difficulty into the consumer market.

Direct Methanol Fuel Cell (DMFC) market forecasts indicate markets at \$65.6 million in 2009 are anticipated to reach \$1.1 billion by 2016. DMFC will account for 85% of the portable fuel cell market by the end of the forecast period.

Keywords: DMFC, Nanotechnology Catalysts, Direct Methanol Fuel Cell, DMFC Cellphone Charging, DMFC Peripheral Charging , DMFC Catalysts, Laptops, Misc. Gadgets, Samsung Military Fuel Cell , DMFC Fuel Cell Prototypes, Methanol-Powered Dock , Power A Laptop For A Month, DMFC (Direct Methanol Fuel Cell, Activated Carbon, NaOH, Chemical Activation, Pore size Distribution, DirectMethanolFuelCell, DMFC Portable Power, Laptop Fuel Cell, Cell Phone Fuel Cell, Broadband Fuel Cell, FuelCell, DMFC Portable Power, , Nanotechnology in Fuel Cells , DMFC Proves More Reliable Than Liquid Hydrogen Fuel Cells, Portable Power Applications of DMFC, Active And Passive DMFC, www.wintergreenresearch.com, <http://wintergreenresearch.com/reports/DMFC.htm>, Direct Methanol Fuel Cell DMFC Market Forecasts

OPPORTUNITY ABOUNDS

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Companies Profiled

Market Leaders

Toshiba
ViaSpace
Energy AG / SFC Smart Fuel Cell AG
IRD A/S

Market Participants

Direct Methanol Fuel Cell (DMFC) Company Profiles
Arrowhead Research Corporation
Unidym Carbon Nanotechnologies
BASF
BIC
Cabot Corporation
Celanese
Ceres Power
ClearEdge Power
DTI Energy, Inc. (DTI)
DuPont
Hitachi
IRD Fuel Cell Technology A/S MEA Manufacturing Line From Cabot Corporation
Jadoo Power
Johnson Mathley
LG CHEM
Manhattan Scientifics
Neah
Oorja
Panasonic
PolyFuel
Tokai
Viaspace / Direct Methanol Fuel Cell Corporation
Direct Methanol Fuel Cell Corporation Business Partners

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Selected Fuel Cell Companies
Fuel Cells: Nanotechnology Company Directory
MTI Micro
UltraCell
Cabot
Johnson Matthey Fuel Cells
QuantumSphere
Advent Technologies SA
Altair Nanomaterials, Inc.
BWT (Best Water Technology)
Dupont Fuel Cells
Nafion® Membranes and Dispersions
FuMA-Tech a division of BWT AG German web site
Hoku Scientific
Hydrocell Ltd
Ion Power, Inc.
ITM Power Ltd
PolyFuel
NexTech
Cell Impact AB
3M 5-94
Altek Fuel Group
Celanese
Dupont Fuel Cells
Electrochem
Gore™ Fuel Cell Technologies
Hoku Scientific
IRD A/S
Pacific Fuel Cell Corp.
PEMEAS
Umicore pMembrain
Johnson Matthey Fuel Cells
Ballard Power Systems
Dana Corporation

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Direct Methanol Fuel Cell (DMFC) Market Shares, Strategies, And Forecasts, Worldwide, Nanotechnology, 2010 to 2016

Report Methodology

This is the 458th report in a series of primary market research reports that provide forecasts in communications, telecommunications, the Internet, computer, software, telephone equipment, health equipment, and energy. Automated process and significant growth potential are a priorities in topic selection. The project leaders take direct responsibility for writing and preparing each report. They have significant experience preparing industry studies. Forecasts are based on primary research and proprietary data bases.

The primary research is conducted by talking to customers, distributors and companies. The survey data is not enough to make accurate assessment of market size, so WinterGreen Research looks at the value of shipments and the average price to achieve market assessments. Our track record in achieving accuracy is unsurpassed in the industry. We are known for being able to develop accurate market shares and projections. This is our specialty.

The analyst process is concentrated on getting good market numbers. This process involves looking at the markets from several different perspectives, including vendor shipments. The interview process is an essential aspect as well. We do have a lot of granular analysis of the different shipments by vendor in the study and addenda prepared after the study was published if that is appropriate.

Forecasts reflect analysis of the market trends in the segment and related segments. Unit and dollar shipments are analyzed through consideration of dollar volume of each market participant in the segment. Installed base analysis and unit analysis is based on interviews and an information search. Market share analysis includes conversations with key customers of products, industry segment leaders, marketing directors, distributors, leading market participants, opinion leaders, and companies seeking to develop measurable market share.

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Over 200 in depth interviews are conducted for each report with a broad range of key participants and industry leaders in the market segment. We establish accurate market forecasts based on economic and market conditions as a base. Use input/output ratios, flow charts, and other economic methods to quantify data. Use in-house analysts who meet stringent quality standards. Interviewing key industry participants, experts and end-users is a central part of the study. Our research includes access to large proprietary databases. Literature search includes analysis of trade publications, government reports, and corporate literature.

Findings and conclusions of this report are based on information gathered from industry sources, including manufacturers, distributors, partners, opinion leaders, and users. Interview data was combined with information gathered through an extensive review of internet and printed sources such as trade publications, trade associations, company literature, and online databases. The projections contained in this report are checked from top down and bottom up analysis to be sure there is congruence from that perspective.

The base year for analysis and projection is 2009. With 2009 and several years prior to that as a baseline, market projections were developed for 2010 through 2016. These projections are based on a combination of a consensus among the opinion leader contacts interviewed combined with understanding of the key market drivers and their impact from a historical and analytical perspective. The analytical methodologies used to generate the market estimates are based on penetration analyses, similar market analyses, and delta calculations to supplement independent and dependent variable analysis. All analyses are displaying selected descriptions of products and services.

This research includes referencde to an ROI model that is part of a series that provides IT systems financial planners access to information that supports analysis of all the numbers that impact management of a product launch or large and complex data center. The methodology used in the models relates to having a sophisticated analytical technique for understanding the impact of workload on processor consumption and cost.

WinterGreen Research has looked at the metrics and independent research to develop assumptions that reflect the actual anticipated usage and cost of systems. Comparative analyses reflect the input of these values into models.

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The variables and assumptions provided in the market research study and the ROI models are based on extensive experience in providing research to large enterprise organizations and data centers. The ROI models have lists of servers from different manufacturers, Systems z models from IBM, and labor costs by category around the world. This information has been developed from WinterGreen research proprietary data bases constructed as a result of preparing market research studies that address the software, energy, healthcare, telecommunications, and hardware businesses.

YOU MUST HAVE THIS STUDY

Direct Methanol Fuel Cell (DMFC) Market Shares, Strategies, and Forecasts, Worldwide, 2010-2016

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ABOUT THE COMPANY

WINTERGREEN RESEARCH, HAS A UNIQUE RESEARCH STRATEGY THAT RELATES TO IDENTIFYING MARKET TRENDS THROUGH READING AND INTERVIEWING OPINION LEADERS. BY READING THE ELECTRONIC EQUIVALENT OF 40 FEET OF PAPER, WINTERGREEN RESEARCH SENIOR ANALYSTS CAN LEARN A LOT MORE ABOUT MARKETS, A LOT FASTER THAN CAN BE LEARNED THROUGH EXPENSIVE SURVEYS AND FOCUS GROUPS. THINKING ABOUT MARKET TRENDS IS A HIGH PRIORITY AT WINTERGREEN RESEARCH. AS WITH ALL RESEARCH, THE VALUE PROPOSITION FOR COMPETITIVE ANALYSIS COMES FROM INTELLECTUAL INPUT.

IT IS A LUXURY REALLY, AVAILABLE TO ONLY A VERY FEW PEOPLE, TO BE ABLE TO GATHER INFORMATION, LOTS OF INFORMATION FROM READING MASSIVE AMOUNTS OF CONTENT, AND THEN TRYING TO MAKE SENSE OF THAT CONTENT. THE ABILITY TO THINK ABOUT MARKET TRENDS IS ENHANCED BY DOING IT OVER AND OVER FOR MANY DIFFERENT MARKETS. THAT IS WHAT WINTERGREEN RESEARCH IS ALL ABOUT: READING AND THINKING IS AN ESSENTIAL ASPECT OF COMPETITIVE ANALYSIS. TALKING TO OPINION LEADERS IS THE THIRD ESSENTIAL ASPECT OF PRODUCING GOOD, RELIABLE DATA.

WINTERGREEN RESEARCH, FOUNDED IN 1985, PROVIDES STRATEGIC MARKET ASSESSMENTS IN TELECOMMUNICATIONS, COMMUNICATIONS EQUIPMENT, HEALTH CARE, INTERNET AND ADVANCED COMPUTER TECHNOLOGY. INDUSTRY REPORTS FOCUS ON OPPORTUNITIES THAT EXPAND EXISTING MARKETS OR DEVELOP MAJOR NEW MARKETS. THE REPORTS ASSESS NEW PRODUCT AND SERVICE POSITIONING STRATEGIES, NEW AND EVOLVING TECHNOLOGIES, AND TECHNOLOGICAL IMPACT ON PRODUCTS, SERVICES, AND MARKETS. MARKET SHARES ARE PROVIDED. LEADING MARKET PARTICIPANTS ARE PROFILED, AND THEIR MARKETING STRATEGIES, ACQUISITIONS, AND STRATEGIC ALLIANCES ARE DISCUSSED. THE PRINCIPALS OF WINTERGREEN RESEARCH HAVE BEEN INVOLVED IN ANALYSIS AND FORECASTING OF INTERNATIONAL BUSINESS OPPORTUNITIES IN TELECOMMUNICATIONS AND ADVANCED COMPUTER TECHNOLOGY MARKETS FOR OVER 30 YEARS.

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