



Microporous
Membranes

CELGARD

A **POLYPORE** Company

Proven Performance.



With more than 30 years of experience in the development and manufacturing of high-performance membrane separators, Celgard is a recognized leader among lithium battery material suppliers, delivering outstanding product performance, reliable supply, technical solutions, and global business support.

Power for Mobility.

We have a long history of supplying membrane separators for leading-edge portable power applications. Because of their unique characteristics and reliable performance, our patented monolayer and trilayer separators are used in a broad range of high-technology energy storage applications, including:

Rechargeable Lithium-Ion Batteries:

- Notebook Computers
- Mobile Telephones
- Digital Cameras and Camcorders
- Audio/Video Players & Toys
- Cordless Power Tools
- Reserve Power Systems & Electricity Grid Storage
- Hybrid & Electric Vehicles

Disposable Lithium-Ion Batteries:

- Photographic Equipment
- Implantable & Other Medical Devices
- Military & Space Exploration Applications

Specialty Energy Storage:

- Vented Nickel Cadmium (NiCd)
Aircraft Batteries
- Zinc-Air Hearing Aid Batteries
- Nickel-Zinc (Ni-Zn) Batteries
- Ultracapacitors (EDLC)

Fifth expansion of
Charlotte facility 2011

First & second expansion
of Concord facility 2010

Fourth expansion of
Charlotte facility

First expansion of
Celgard Korea (USA)
New Concord facility announced

Third expansion of
Charlotte facility
Celgard Korea
facility opens 2008

Shanghai
facility opens 2005

Second expansion
of Charlotte facility 2004

First expansion of
Charlotte facility 1997

Entry into secondary
lithium market 1994

Entry into primary
lithium market 1987

First commercial sales
of Celgard® film 1974

First microporous film
patents granted 1969

Unparalleled Product Portfolio.

Celgard has the broadest portfolio of products available in the lithium battery separator industry, designed to meet the needs of battery cell manufacturers and their customers.

Celgard® brand battery separators offer excellent electrical performance, dimensional integrity, and chemical and thermal stability in lithium-ion and other specialty battery and barrier-type applications.

Regardless of the type of battery cell required, the Celgard® product portfolio provides the best solution for quality, reliability, and performance.

TYPICAL PROPERTIES: COMMERCIAL PRODUCTS

Film Properties	Monolayer Polypropylene (PP)	Monolayer Polyethylene (PE)	Trilayer Products (PP/PE/PP)
Thickness	16 to 25 microns	16 to 20 microns	12 to 38 microns
JIS Gurley	200 to 620 seconds	160 to 360 seconds	320 to 780 seconds
Porosity	40 to 55%	40 to 50%	35 to 50%

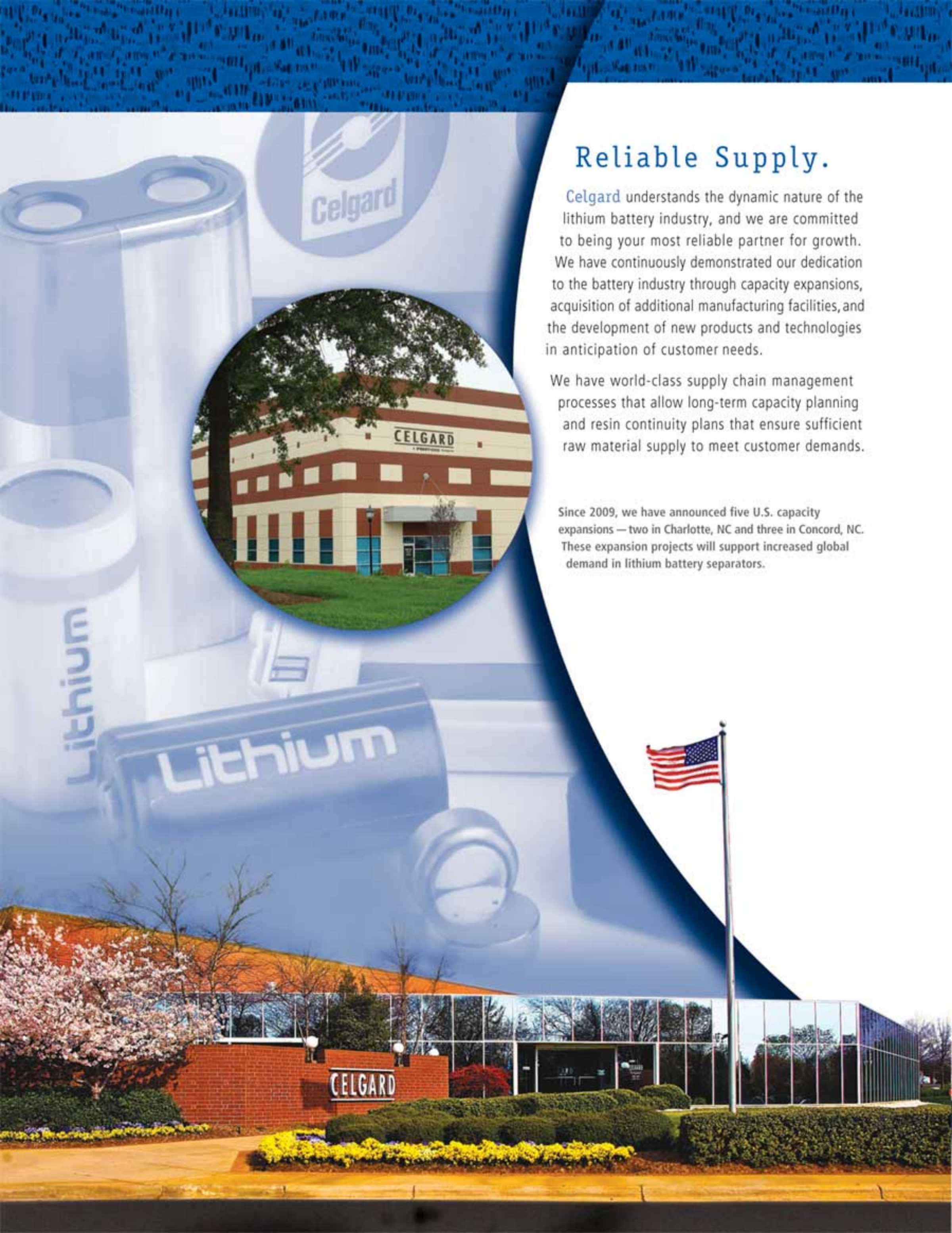


Reliable Supply.

Celgard understands the dynamic nature of the lithium battery industry, and we are committed to being your most reliable partner for growth. We have continuously demonstrated our dedication to the battery industry through capacity expansions, acquisition of additional manufacturing facilities, and the development of new products and technologies in anticipation of customer needs.

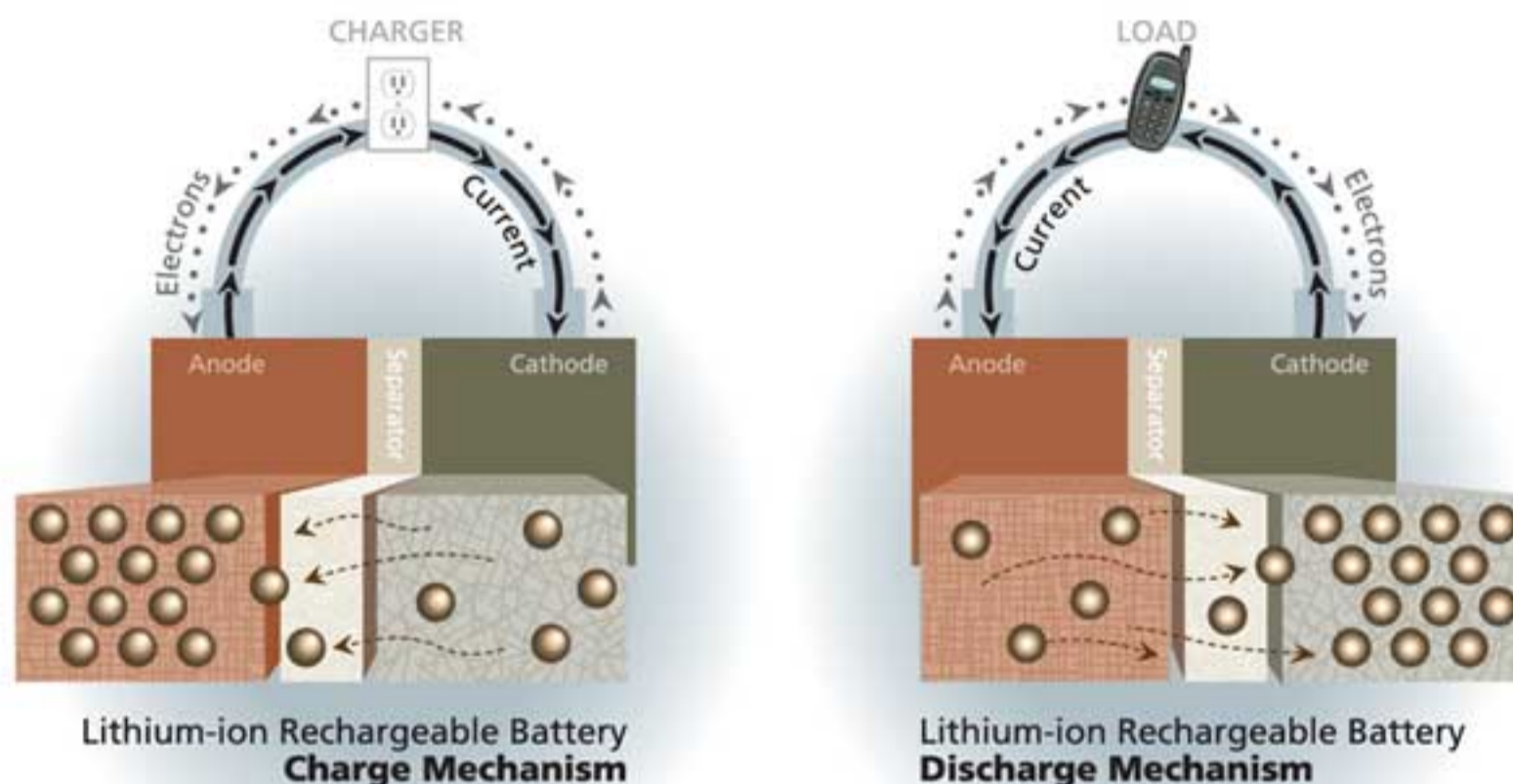
We have world-class supply chain management processes that allow long-term capacity planning and resin continuity plans that ensure sufficient raw material supply to meet customer demands.

Since 2009, we have announced five U.S. capacity expansions — two in Charlotte, NC and three in Concord, NC. These expansion projects will support increased global demand in lithium battery separators.



R&D Expertise...

Celgard® brand microporous membrane separators are among the most highly-engineered and critical components of lithium batteries, providing a barrier between the anode and cathode while performing the core function of facilitating ion exchange. We take pride in our Research & Development teams of scientists, engineers, and technical specialists, who enable us to remain a market leader in technology development.



Celgard® battery separators provide a barrier between the anode and the cathode while enabling the exchange of lithium ions from one side to the other.

...and Customized Technical Solutions.

Celgard's Applications Development teams work with customers to co-develop customized battery solutions that optimize cell performance in unique battery system applications.

Our in-house Battery and Separator Applications Laboratories boast state-of-the-art dry room and pilot-scale assembly operations, as well as electrical, mechanical and safety performance testing capabilities.

CELGARD TECHNICAL RESOURCES

Research & Development Group

Polymer Scientists & Engineers

Chemistry & Coating Lab

Pilot-Scale Extrusion & Stretching Equipment

In-House Battery & Separator Applications Labs

Electrochemical Scientists & Engineers

Complete Electrochemistry Lab

Dry Room & Battery Assembly Operations

Battery Safety & Performance Testing

Thorough Separator Characterization & Evaluation Capabilities

Customer-Oriented Application Analysis

CELGARD

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A Commitment to Quality.

Celgard is committed to operating in a manner that meets or exceeds environmental and customer standards, and maintains certification to the ISO 9001 Quality Management and ISO 14001 Environmental Management Systems.



ISO 9001
ISO 14001

Unmatched Manufacturing Capabilities.

With the addition of Celgard Korea in 2008, we are further equipped with a broad range of manufacturing process technologies to produce products that meet the needs of virtually any customer application.

Celgard Manufacturing Process Capabilities

Dry (Melt) Process

Wet (Cast) Process

Available in a Range of Thicknesses

Multiple Slit Width Options

Lamination to Non-woven Backing Materials

Can Be Treated to Meet Specific Application Requirements

- For Hydrophobic or Hydrophilic Capabilities
- For Enhanced Electrolyte Absorption



Strong Global Presence.

With company headquarters in Charlotte, North Carolina, USA and manufacturing facilities in the United States, Korea, and China, we are ideally positioned to serve the just-in-time needs of a global market. Worldwide business support is provided by our expert sales and technical service staff located throughout Asia, North America, and Europe.



The opening of Celgard Korea in 2008 broadened our capabilities with the addition of wet process manufacturing technology, allowing Celgard to accommodate a wider variety of customer preferences than any other separator supplier. As a result of early success, we announced an expansion of this facility in 2010 that was completed and came online in 2011.



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Celgard is a wholly-owned subsidiary of Polypore International, Inc. As a leading global high technology filtration company specializing in microporous polymer-based membranes, Polypore develops, produces and markets products that touch businesses and lives every day.

Proven Technology Leadership

Polypore has a tradition of innovation—with more than 200 patents and major breakthroughs in every market that we serve.

Global Infrastructure and Presence

With manufacturing facilities and sales and technical service offices throughout the Americas, Europe and Asia, we have the scale and critical mass to serve customers on a global scale.

Committed to Your Success.

Celgard is committed to helping your business succeed. Partnering with us ensures you are collaborating with a market leader that customers around the world have depended on for decades as a source for quality products, reliable supply, and technical expertise.

Please contact your local Celgard sales or technical service representative or visit our website at www.Celgard.com to find out how we can tailor our innovative membrane solutions to meet your specific needs.

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