CELGARD

Company Introduction & Product Overview

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AsahiKASEI

Asahi Kasei: Corporate Profile

Trade name
Asahi Kasei Corp.

Head office
Tokyo, Japan

President
Koshiro Kudo

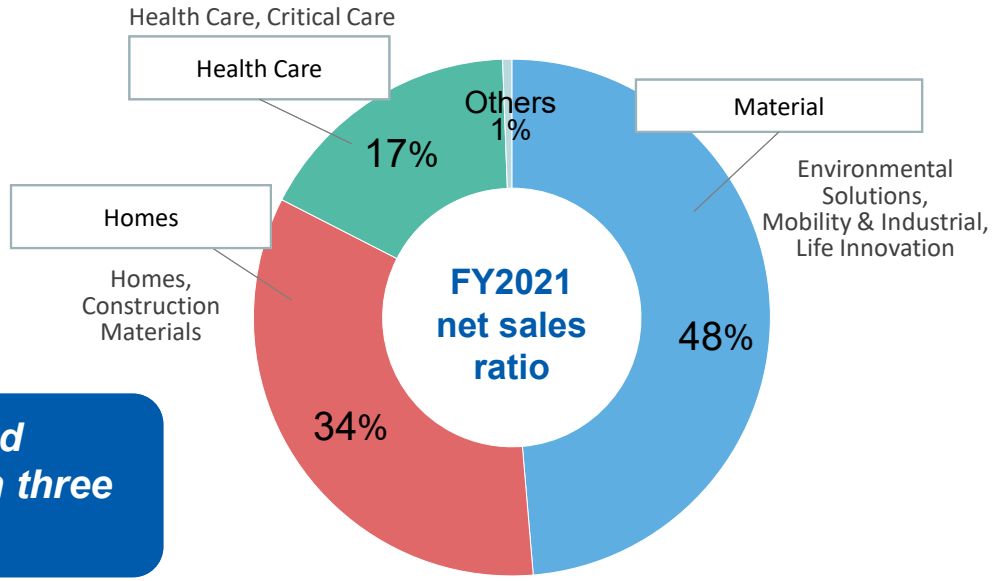
Founding
1922

Paid-in capital*
¥103.4 billion

Employees*
46,751

Fiscal 2021 results

Net sales:	¥2,461.3 billion ($20.1 billion)
Operating income:	¥202.6 billion ($1.7 billion)



We are a diversified chemical company with three business sectors

Head Office

**As of March 31, 2022*
(¥122.41 per US$)

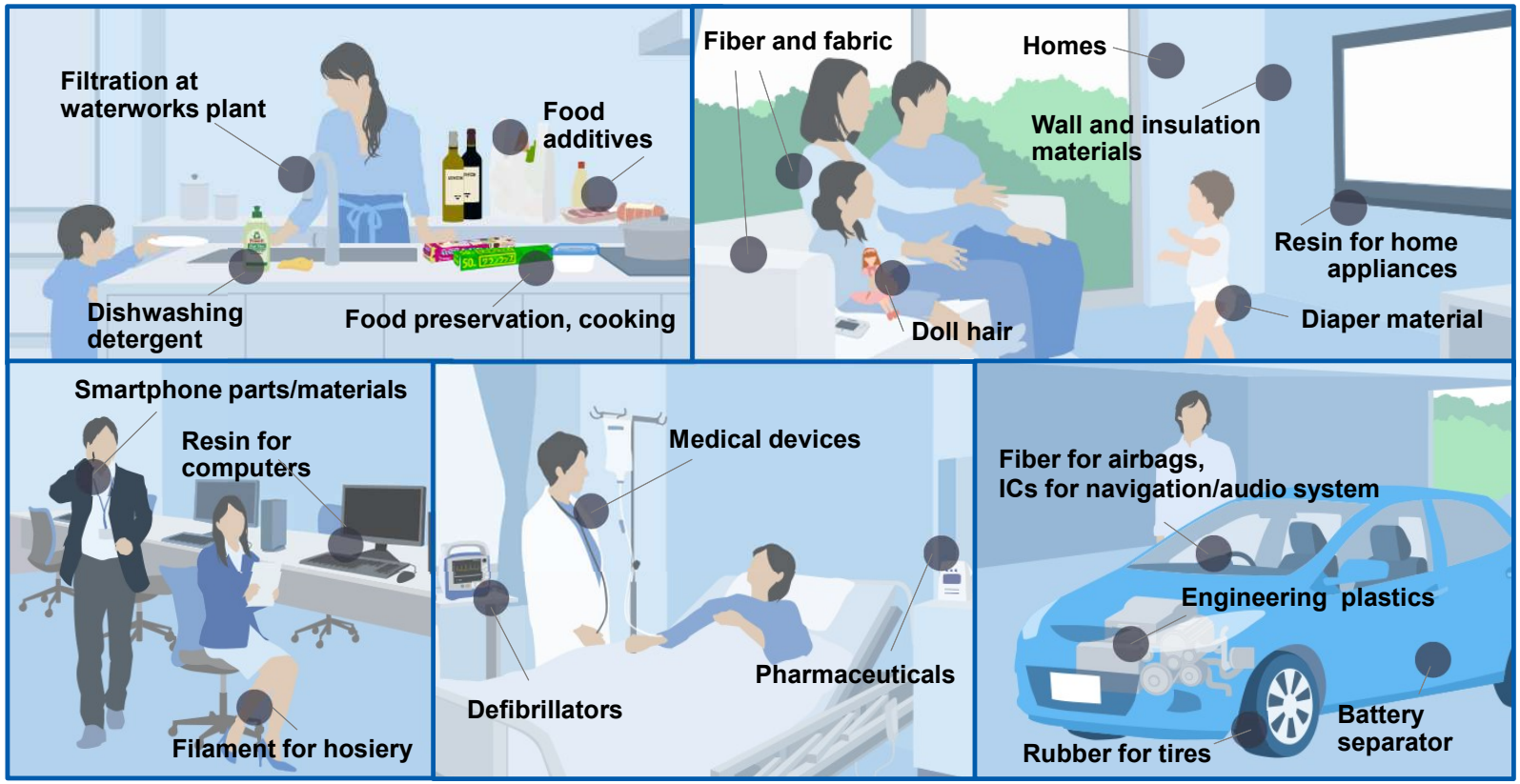
Asahi Kasei: Products & Technologies in Everyday Life

3 Business Sectors

Material

Homes

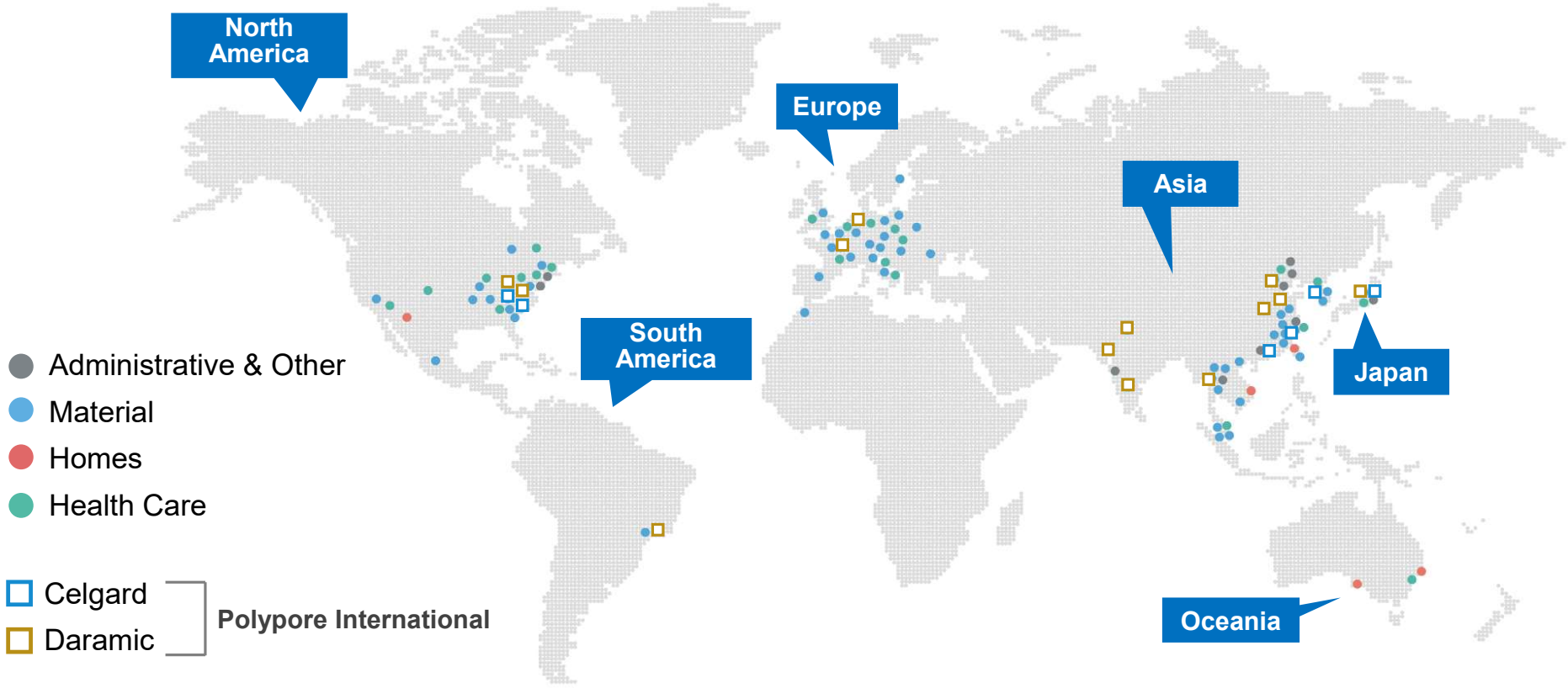
Health Care



Asahi Kasei's products and technologies are used in various ways all around us every day

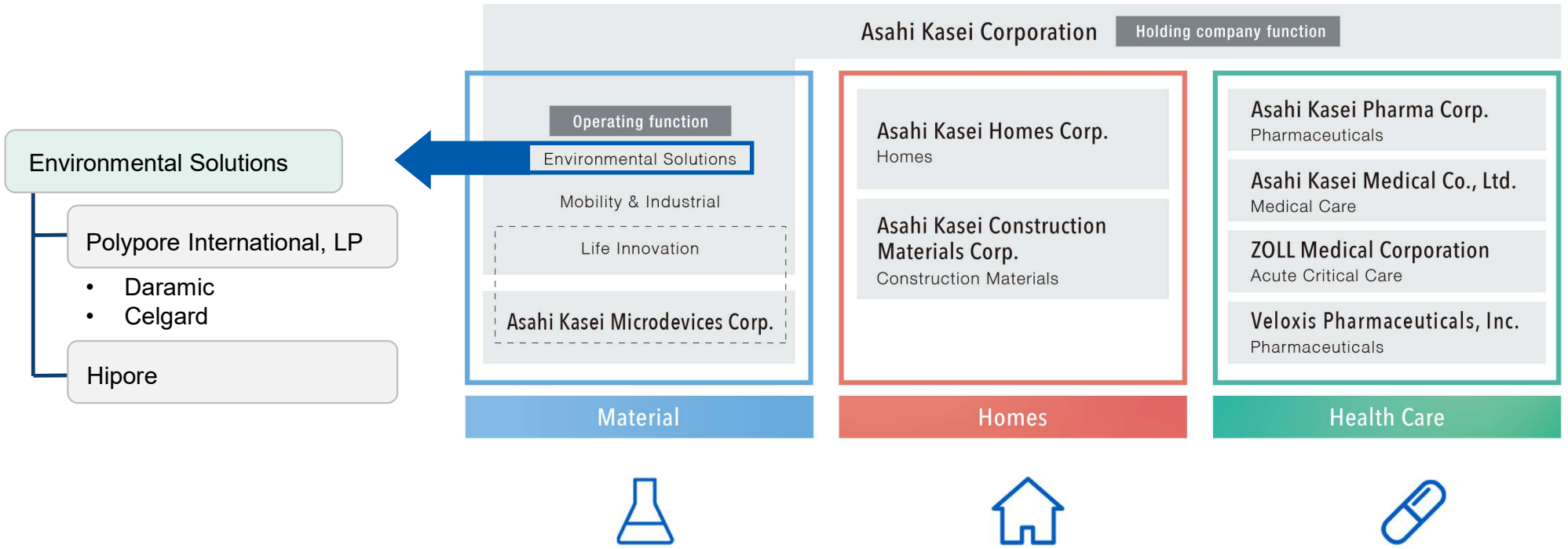
Asahi Kasei: Global Network

Manufacturing, sales, and R&D sites of the Asahi Kasei Group are located in more than 20 countries around the world to meet a wide range of needs in the global market



Asahi Kasei: Corporate Configuration

Centered on the operating holding company Asahi Kasei Corp. and seven core operating companies, the Asahi Kasei Group is a diversified global manufacturer with three business sectors of Material, Homes, and Health Care



Asahi Kasei: Environmental Solutions: Battery Separators

AsahiKASEI

For Lead-Acid Batteries

DARAMIC

For Lithium-Ion Batteries

CELGARD

HIPORE

Polypore International

The Leading Global Supplier of Battery Separators

Three businesses within the Environmental Solutions Strategic Business Unit (SBU) provide unique battery separator technologies that allow Asahi Kasei to cover a full range of application and technology needs

Asahi Kasei: Full Spectrum of Separator Solutions

Conventional	SS@ signal	Recuperation	Low speed coasting	High-speed coasting	Powertrain Boosting	Powertrain Boosting	Plug in	Pure EV
Basic SLI	Simple Start-Stop	Advanced Start-Stop	In-Motion Start-Stop	12 or 40+ Volt System	Mild HEV	Strong HEV	PHEV	EV

Lead-Acid Battery

Li-ion Battery

Daramic

Hipore/Celgard

DARAMIC

World largest lead-acid battery separator manufacturer

AsahiKASEI

HIPORE CELGARD

World largest Li-ion battery separator manufacturers

Celgard: More than 50 Years of Know-How

With more than 50 years of market-leading research, development, and manufacturing, Celgard delivers **highly-engineered products with proven quality and performance**

Celgard® film for Lithium primary batteries begins

1st plant built in Charlotte, N.C.

Expansion into China and Korea.

Ceramic Coated Separators Developed

2nd expansion in Charlotte

1970s **1980s** **1990s** **2000s** **2010s** **2020s**

First microporous film patents granted in 1960s

Entry into lithium-ion battery market.

Celgard® Trilayer Introduced

1st expansion in Charlotte

Mass-production for EDV lithium-ion battery

2nd plant built in Concord N.C.

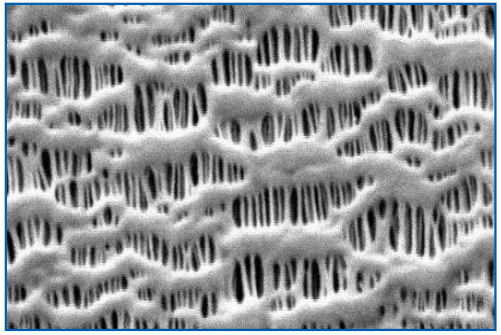
A Recognized Leader in Membrane Technology

- **A Proven Global Leader**
  - More than 50 years of expertise in the development and production of high-performance membrane technology
- **Global Reach and Local Support**
  - Manufacturing facilities in the USA and China
  - Sales and technical service staff throughout Asia, Europe, and North America
- **Broadest Portfolio of Products and Solutions**
  - Designed for outstanding performance in broad range of energy storage and other barrier-type and specialty applications
  - Multiple base film technologies and extensive coating capabilities
  - Installed on >70 Electric Drive Vehicle (EDV) models
- **Technical Leadership and Expertise**
  - Significant research and development from our teams of scientists, engineers, and technical specialists
  - Culture of close collaboration with customers to optimize separator technical performance and value
  - Strong, active, growing, and protected global patent portfolio, including the critical patents on ceramic coated separators

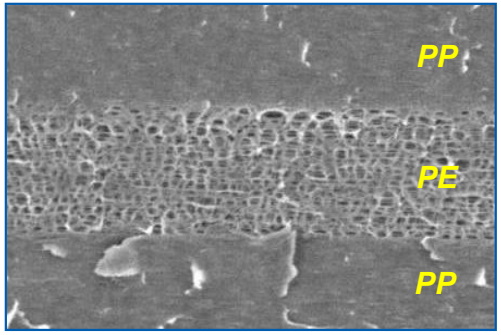
Product Overview

- Celgard is the only separator manufacturer with a complete range of products engineered for:
  - Electric Drive Vehicles (EDV)
  - Energy Storage Systems (ESS)
  - Specialty Batteries
  - Textiles
  - Other Specialty Solutions

- Products Include:
  - Monolayer Polypropylene (PP)
  - Trilayer (PP/Polyethylene(PE)/PP)
  - Co-extruded Monolayer or Multilayer Films



Monolayer PP

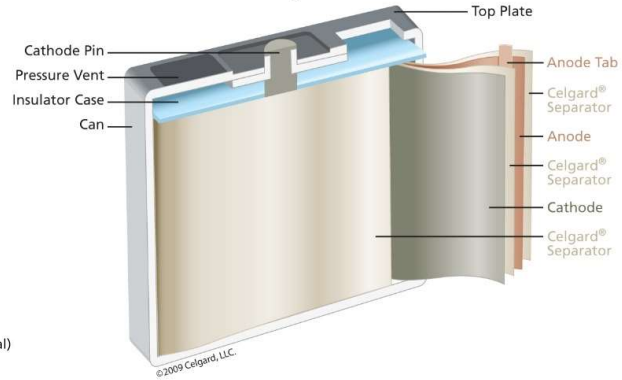


Trilayer PP/PE/PP

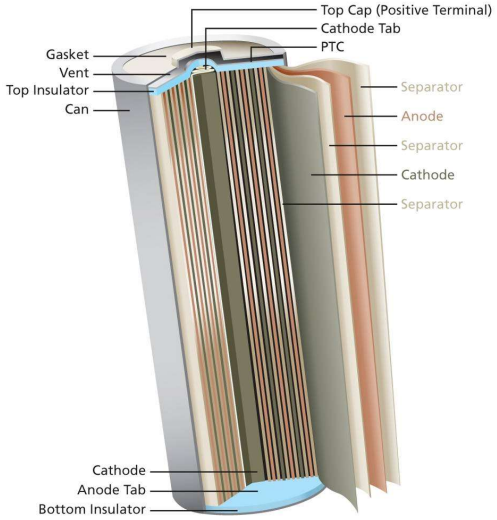
Cell Designs Within a Battery Pack

Typical Lithium-Ion Cell Constructions

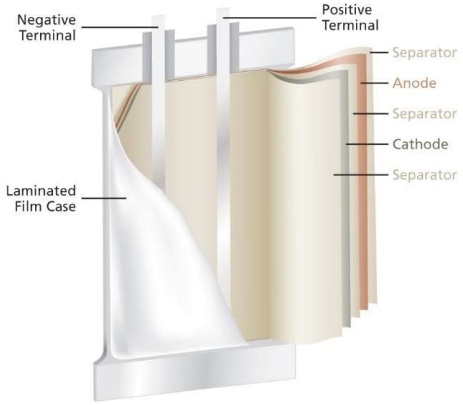
Prismatic Battery

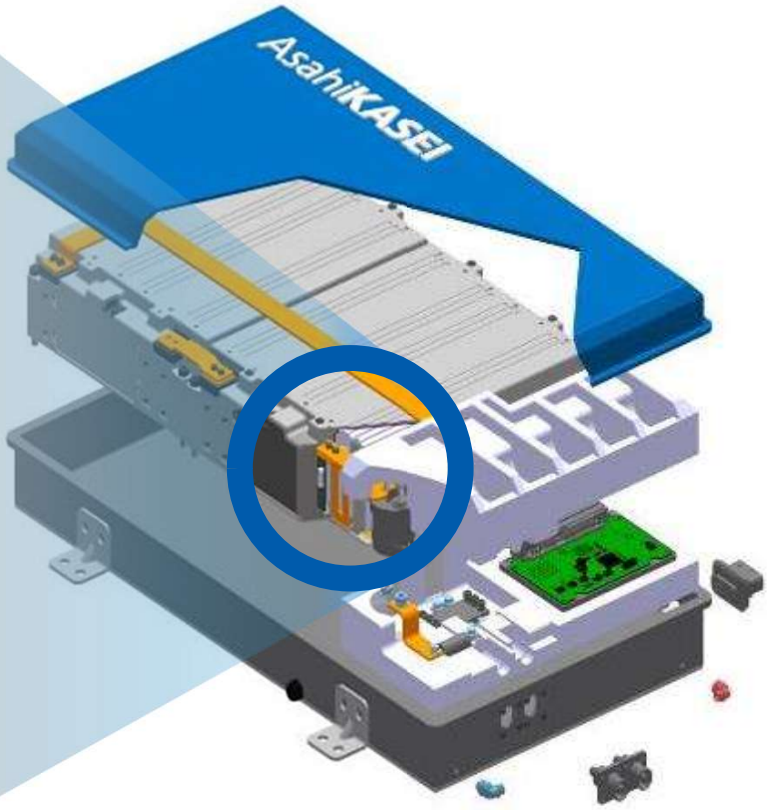


Cylindrical Battery



Polymer Battery





The Markets We Serve

Battery Separators

Electric Drive Vehicles (EDV)

Lithium-ion Batteries for:

- Battery Electric (BEV)
- Plug-in Hybrid Electric (PHEV)
- Hybrid Electric (HEV)
- Mild Hybrid Electric (MHEV)

Energy Storage Systems (ESS)

Lithium-ion Batteries for:

- Utility-level and Grid-level Energy Storage
- Distributed Storage
- Renewables Integration
- Load Leveling

Specialty Batteries

- Lithium Primary
- Zinc Air
- Nickel Zinc
- Nickel Cadmium
- For consumer tools, industrial equipment, satellite systems, implantable medical devices & more

Barrier Applications

Technical Textiles

- Waterproof / Breathable Membranes for Outdoor Apparel
- Viral Protection Membranes for Medical PPE

Other Specialty Applications

- Ultracapacitors
- Transdermal Drug Delivery
- Filtration
- HVAC


CELGARD
Thank you!
At the Center
of Membrane Innovation