

Powering Electric & Hydrogen Vehicles





Electric & Hydrogen Vehicle Solutions

With a long history of partnership and development with the top OEMs, automotive has been an integral industry for Mitsubishi Chemical Group. R&D and growth in high-performance materials and solutions for autonomous and electrified vehicles is at the core of our corporate strategy. Our focus is on partnering with our customers to develop and bringing to market lightweight, sustainable, high value, and functional solutions.

Mitsubishi Chemical Group offer an impressive portfolio ideal for demanding automotive applications such as carbon fiber, composites, high performance engineering plastics, films, and more. As a solution-driven partner, Mitsubishi Chemical brings together high performance materials, engineering processes and innovative design expertise to allow automotive engineers to develop innovative solutions with new levels of functional integration.

Partnership

From reimagining lightweighting structural applications that reduce fuel consumption to redesigning parts to reduce components and processes, our customer-centric approach ensures mutual success. With a focus on decreasing the environmental impact, we partner with customers to develop solutions to their most challenging problems.

KAITEKI | Our Philosophy

At Mitsubishi Chemical Group, sustainability is more than a concept—it's a way of life. Through our focus on improving the health and well-being of people and the planet, we create innovative sustainable solutions globally. The sustainable well-being of people and our planet Earth—we call it KAITEKI.








We believe our role in the chemical industry is to be partners in innovation, developing material solutions that support a circular economy and sustainability of the earth and society. This overarching KAITEKI Philosophy is our guiding principle as we use LESS to have MORE.

LESS RESOURCES | Our technologies extend the loop, conserving resources by transitioning to bio-based and recycled raw materials.

LESS WASTE | We extend raw materials by recycling our own waste and partnering with customers to recycle their waste.

LESS IMPACT | We decrease our impact on the environment through advanced resin innovation and developing lightweight materials.

MORE PRODUCT LIFE | Extending the material properties for extends the useful life of products.

-  Bio-Based
-  Recyclable
-  Recycled Materials
-  Light Weight
-  Process Elimination
-  Low VOC
-  Parts Consolidation

Lithium-Ion Battery Cell & Module Materials

Sol-Rite™ | Formulated Electrolytes

SF-MPG | Anode Materials

Hostaphan™ MTHLK Film | Casting liner

Thermal Management & Fire Protection

MAFTEC™ | Fire shield

Hostaphan™ Opaque Film | Material encapsulation

MODIC™ | Battery cooling lines & tubes

ADTEX™ | Battery cooling lines & tubes

Mitsubishi Thermal spacers | Insulators, conductors

Gelest™ | Gap fillers

Gelest™ | Adhesives

Battery Pack Structural Materials

CF FMC™ | Structural components

KyronMAX™ | Structural components, latches, brackets

GMT™/GMT™ eFR | Structural components, capacitors

KyronTEX™ | Structural components

Prepreg | Structural components

Recycled Carbon Fiber (rCF) | Structural components

Connectors & Electrical Components

NOVADURAN™ | Connectors

Olefista™ | High voltage wiring & connectors

TEFABLOC™ | Wiring & wiring harnesses

Gelest | Protective encapsulates, protective gels, coatings

HV Pressure Vessels & Carriers

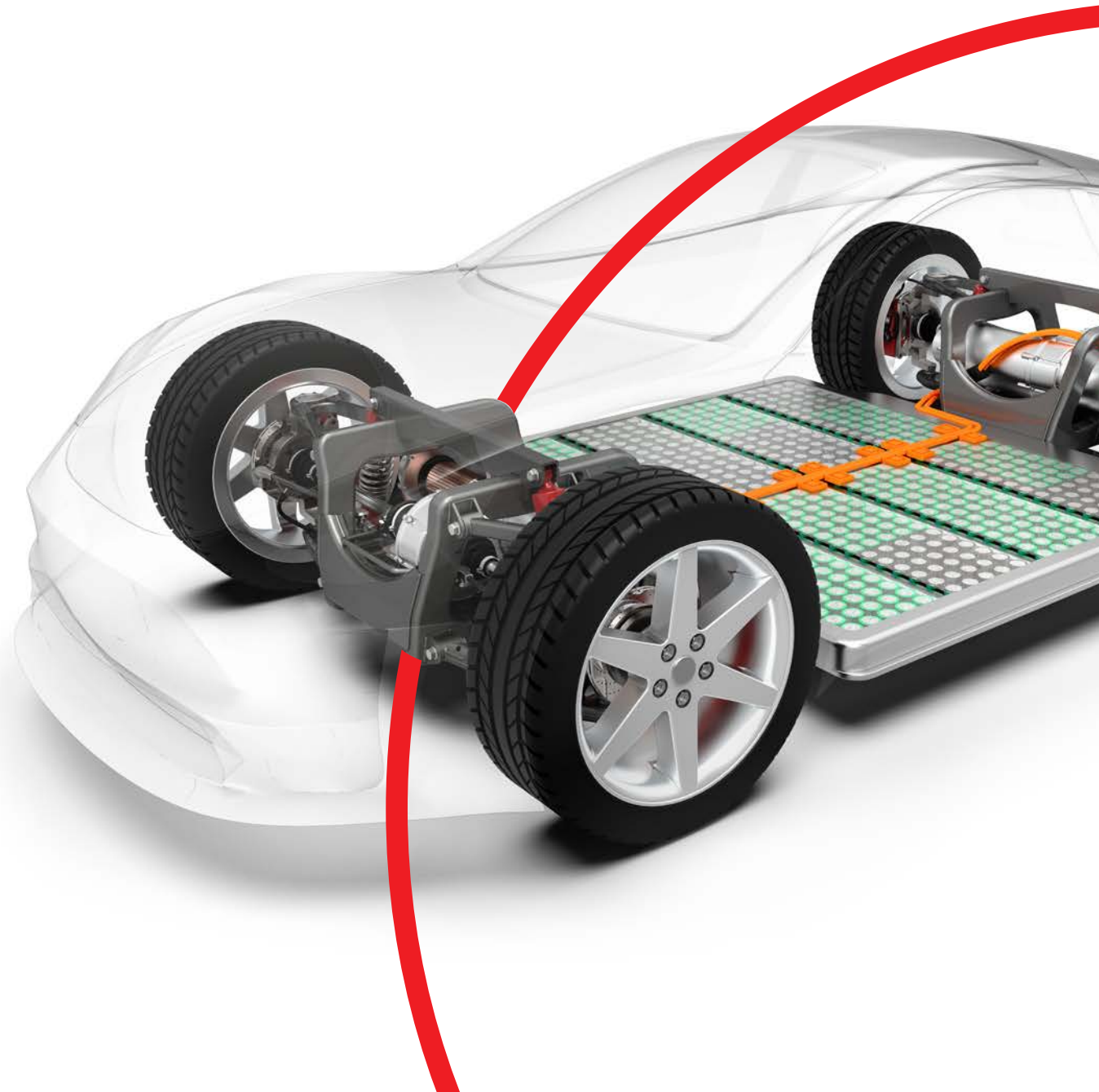
ADTEX™ | Adhesive polymer

SoarnoL™ EVOH | Gas barrier



Pyrofil™ Carbon Fiber Paper | Gas Diffusion Layer

GMT™ eFR | Pressure vessel carrier

Qtex™ | Fuel tank protection



Electric Vehicles

Product	Description	Key Features							
ADTEX™	Adhesive Polymer	High, durable adhesion to EVOH or PA							
CF-FMC	Carbon Fiber Forged Molding Compound	Lightweight CF-reinforced composite with strength and ease of molding							
Gelest™ PP2-TC01/2	Thermally Conductive Adhesive	High thermal conductivity and elongation							
Gelest™ PP2-DG01/2/3	Dielectric Gels	Low viscosity, platinum addition cure							
GMT™ eFR	Fire Retardant Glass Mat-Reinforced Thermoplastic	Design flexibility with integrated parts							
Hostaphan™	Opaque Film	Strong lap seal ensuring package formation and integrity							
Hostaphan™ MTHLK	Casting Liner	High strength, flexibility and chemical resistance							
KyronMAX™	Structural Thermoplastic Composites	World's strongest injection moldable thermoplastic							
KyronTEX™	Structural Thermoplastic Composite Sheet	Lightweight, High strength, High stiffness							
MAFTEC™	Alumina Fiber	Excellent thermal management and fire retardant							
MODIC™	Adhesive Polymer	Excellence adhesion to various materials							
NOVADURAN™	PBT Resin	Excellent mechanical properties, rigidity, heat aging resistance and chemical resistance							
Olefista™	Halogen-Free FR Olefin	Halogen-free, flame retardant							
Prepreg	Compression molding prepreg	Short cycle times, Easy processing, Variety of reinforced fibers and resins available							
Pyrofil™	Carbon Fiber	Lightweight, excellent strength and stiffness							
Qtex™	Organo Sheet	Lightweight, High strength, High stiffness							
rCF	Recycled Carbon Fiber	Lightweight, excellent strength and stiffness							
SF-MPG	Anode Material	High output performance, smooth ion release							
SoarnoL™	High Gas Barrier Resin	Excellent gas and solvent barrier properties							
Sol-Rite™	Formulated Electrolytes	High power density & output							
SymaLITE™	Low Weight Reinforced Thermoplastics	Durable, noise-insulating composite sheets							
TEFABLOC™	TPE	Soft, flexible and multi-material compatibility							
Thermal Spacer	Thermal Responsive Spacer	High heat conductor, unique phase-change behavior							

Innovation

Today, consumers demand more sustainable solutions, driving the need for technology development in materials, manufacturing, and end-of-life impact. As a vertically integrated manufacturer, Mitsubishi Chemical views material innovation through a sustainability lens, and develops custom solutions that address application challenges while also reducing negative environmental and social impacts.

Our sustainable materials support our customers in fulfilling their goals as well as the market demands by offering added value throughout the supply chain. Mitsubishi Chemical material technologies include offerings that:

- Enhance performance and functionality
- Offer state-of-the-art design
- Result in less waste at the end of life
- Optimize energy and resources
- Have less impact on the environment

Carbon Fiber | Fully Vertically Material Supply Chain

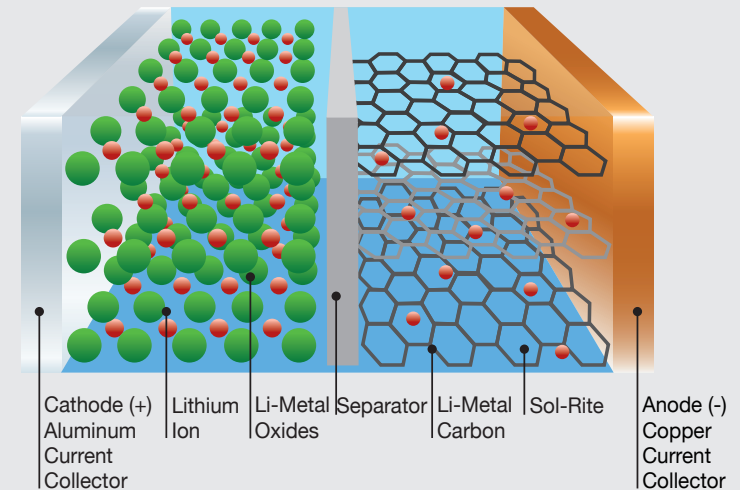
Mitsubishi Chemical Group is uniquely positioned to be able to provide a fully integrated material supply chain for Carbon Fiber - from raw materials to composites to molded parts.



Technology Highlight | Sol-Rite Formulated Electrolytes

Mitsubishi Chemical Group is a leading provider of formulated electrolytes for Li-Ion batteries for the automotive industry. Sol-Rite electrolytes are formulated in organic solvents with functional additives that significantly improve battery performance.

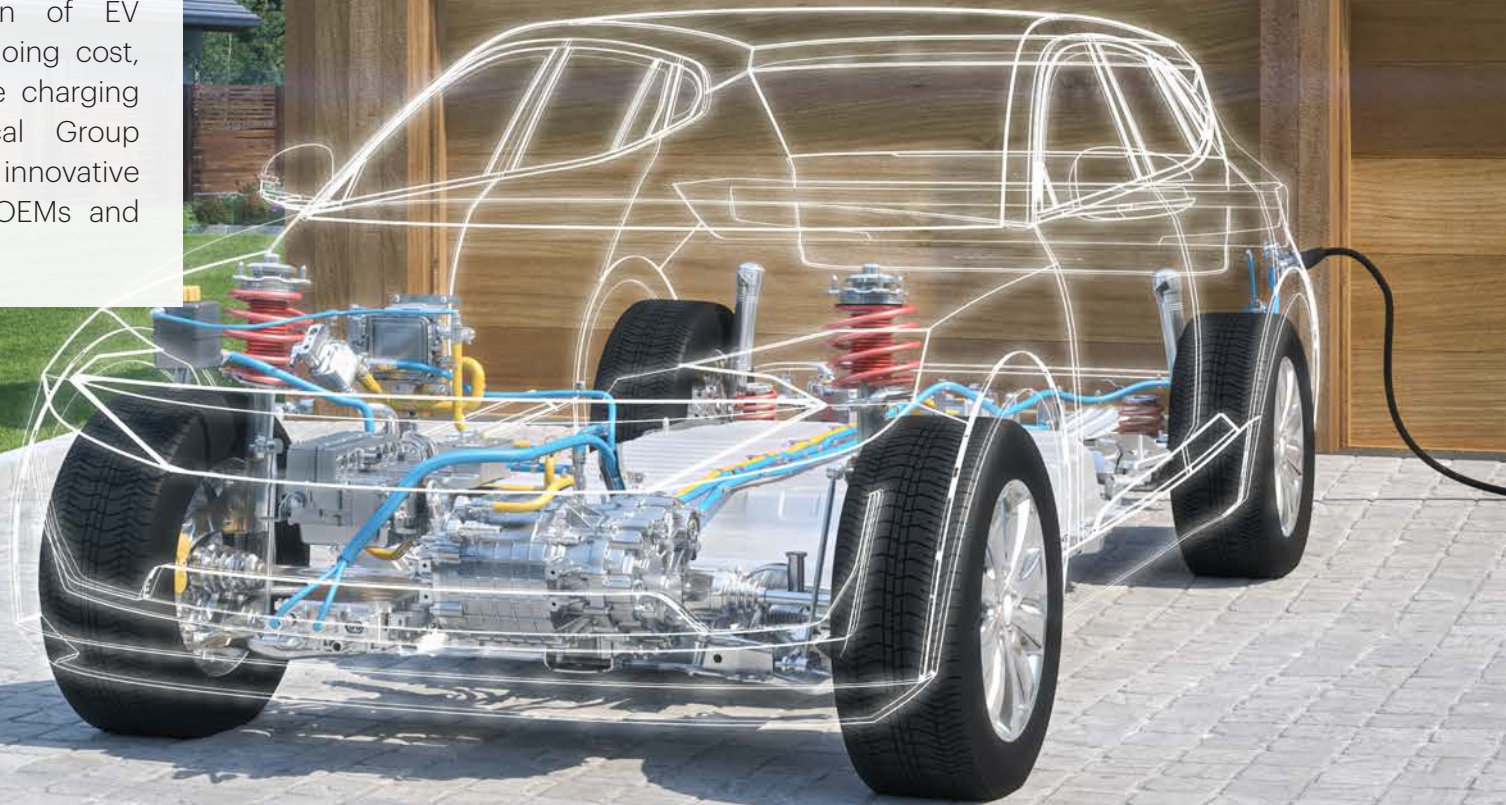
The technology used to develop the specific formulations includes additives with specific functionality, tailored to the application, to protect electrodes and suppress gas generation under high voltage conditions, ensuring that battery capacity is retained at a high level. Additionally, these additives control side reactions and improve cycle performance. With precise formulations per application, OEMs can improve safety and power output under extreme temperature conditions.



Electric Vehicle Challenges

Electric vehicles have brought new challenges to automotive OEMs and consumers alike. From an OEM perspective, two of the key concerns are passenger safety and cost. Safety is impacted by the material selection for rigidity, impact resistance, and thermal stability. Additionally, costs are impacted by material cost, the ease of manufacturing, ease of service, and the bulk and weight of design.

From a consumer perspectives, adoption of EV technology is dependent on initial and on-going cost, safety, driving range, charging time, and the charging network infrastructure. Mitsubishi Chemical Group partners with OEMs and Tiers to develop innovative material solutions to solve concerns from OEMs and consumers—driving sustainable innovation.





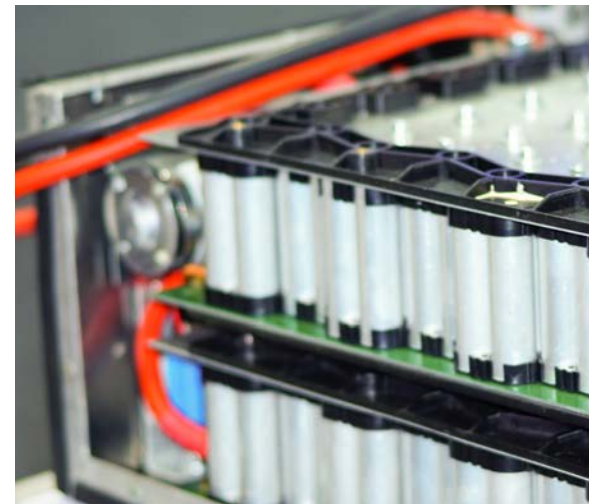
EV Battery Cells

The quality of EV battery cell materials in manufacturing is critical, as any damage can impact the entire battery pack. Mitsubishi Chemical Group incorporates technical expertise and patented technologies to control the solid electrolyte interface on the cathode and anode of each EV battery cell.

Sol-Rite | Formulated electrolytes

SF-MPG | Anode materials

Hostaphan MTHLK Film | Battery cell manufacturing



Thermal Management

Thermal management and fire protection are the most essential components to driver safety in EV battery packs. Mitsubishi Chemical Group has developed solutions for controlling heat flow, fire protection, battery cooling lines and tubes, and foam casting liner. We also have developed advanced silicone adhesives for bonding electronic assemblies in components requiring thermal management.

MAFTEC | Fire shield

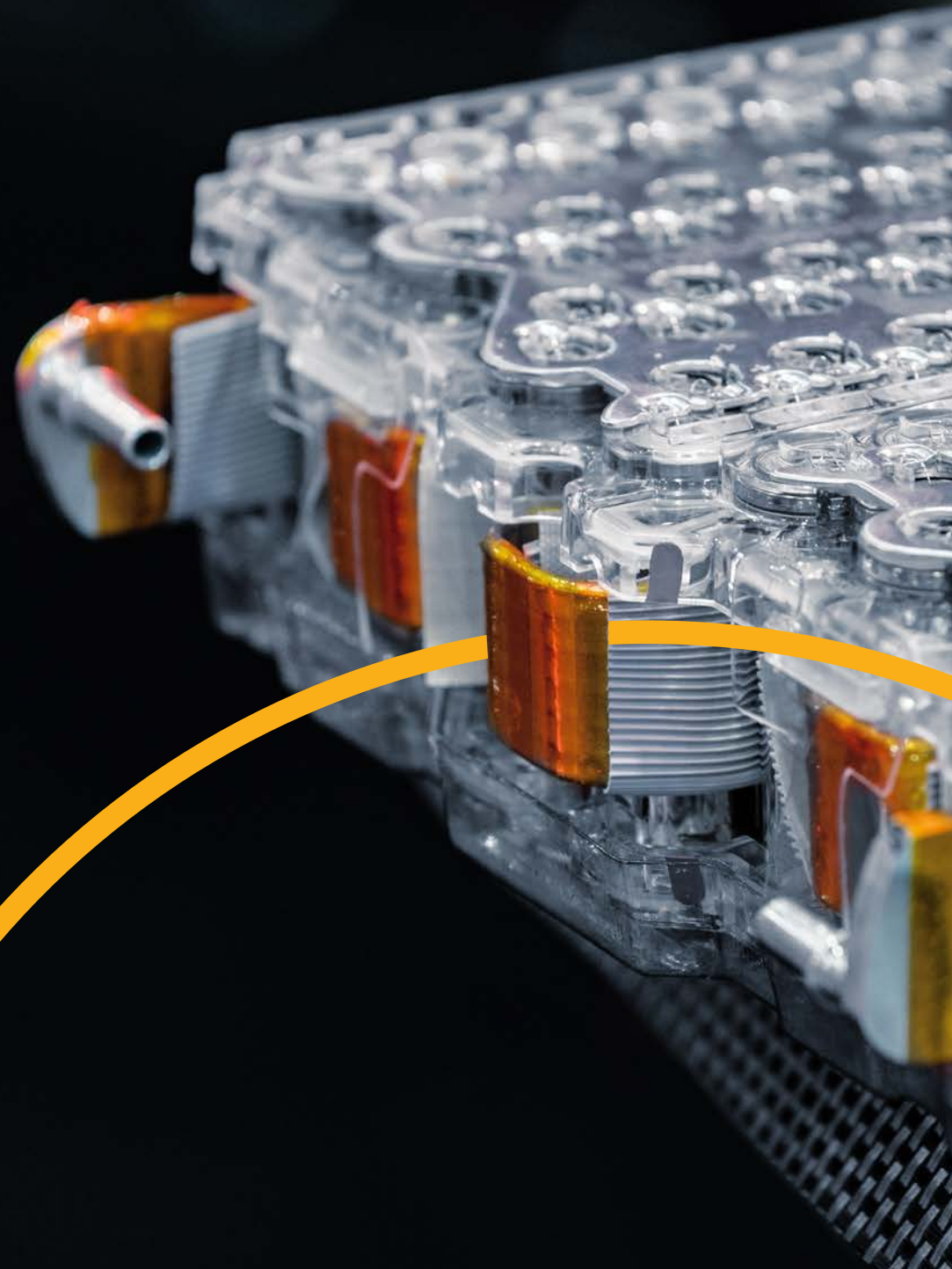
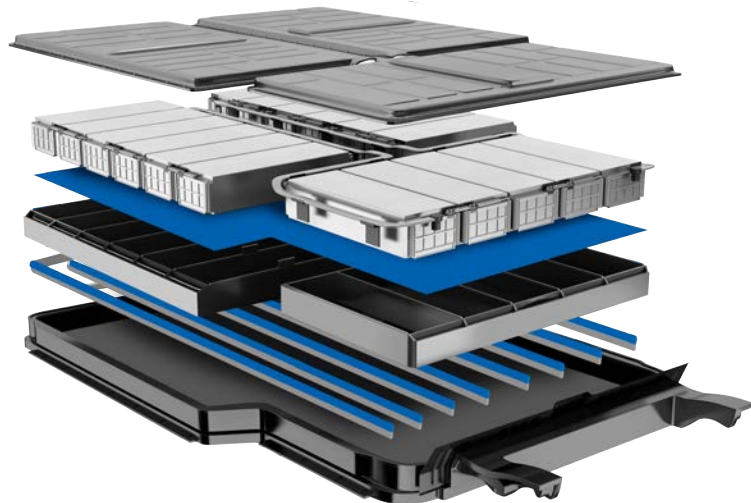
Hostaphan Opaque Film | Material encapsulation

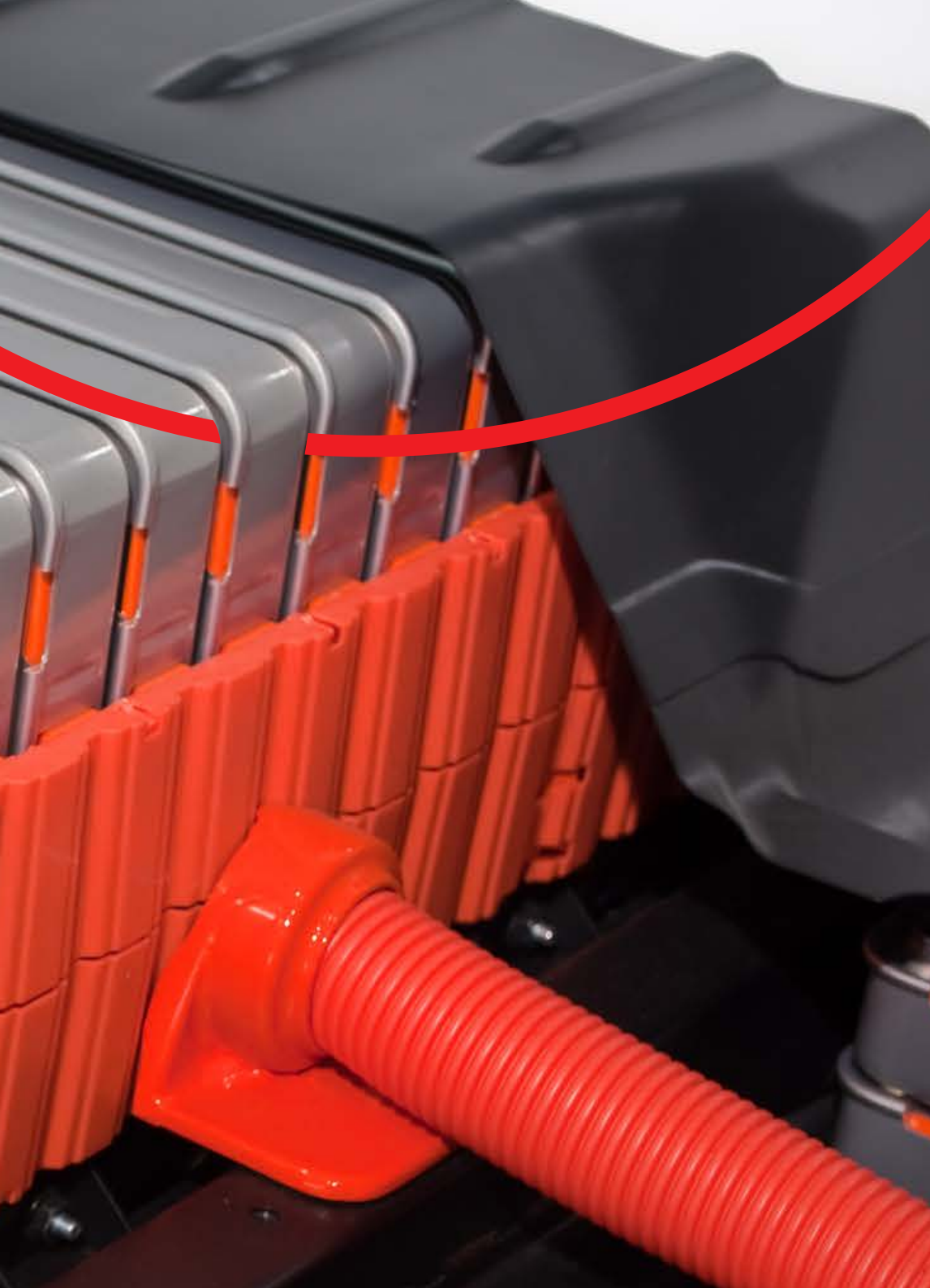
MODIC | Battery cooling lines & tubes

ADTEX | Battery cooling lines & tubes

Thermal spacers | Thermally-responsive spacer,
conductor/insulator

Gelest™ | Gap fillers and adhesives

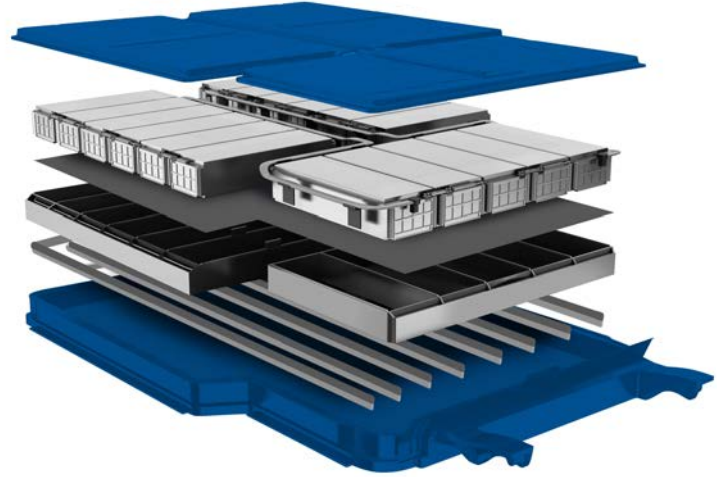




Battery Pack Structural Materials

With a focus on driver safety, Mitsubishi Chemical Group customizes structural, lightweight materials for battery pack housings and enclosures that are designed to out-perform the most stringent material properties. These thermoplastic and thermoset resin systems are reinforced by a variety of materials such as short or long glass fibers, carbon fiber, glass mat, and weave technologies.

- CF FMC | Structural components
- KyronMAX | Structural components, latches, brackets
- GMT | Structural components
- KryonTEX | Structural components
- Prepreg | Structural components
- Recycled Carbon Fiber (rCF) | Structural components
- GMT eFR | Structural components, capacitors



HV Pressure Vessels & Carriers

Material solutions for HVs bring a unique set of challenges to manufacturers. Mitsubishi Chemical Group offers a wide range of structural, lightweight materials and adhesives suitable for CNG and Hydrogen vehicle pressure vessels and carriers. These thermoset and thermoplastic materials fulfill the most demanding crash and mechanical property requirements.

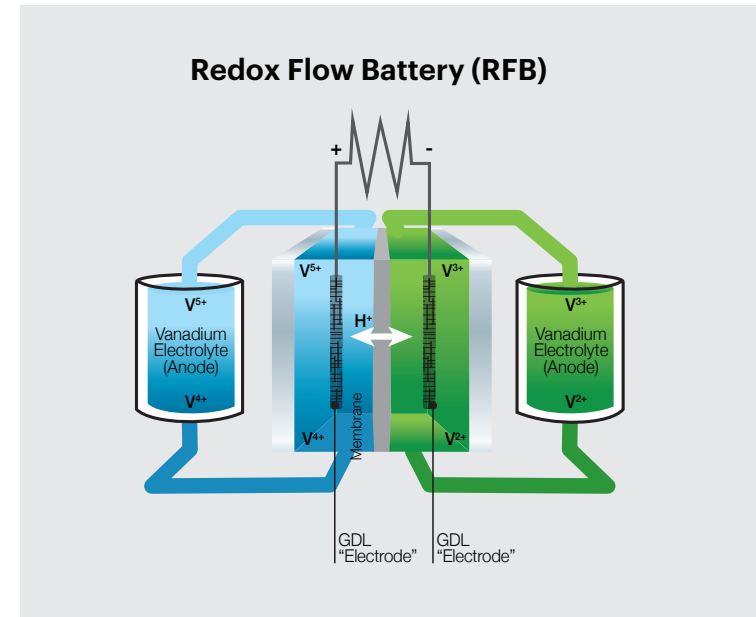
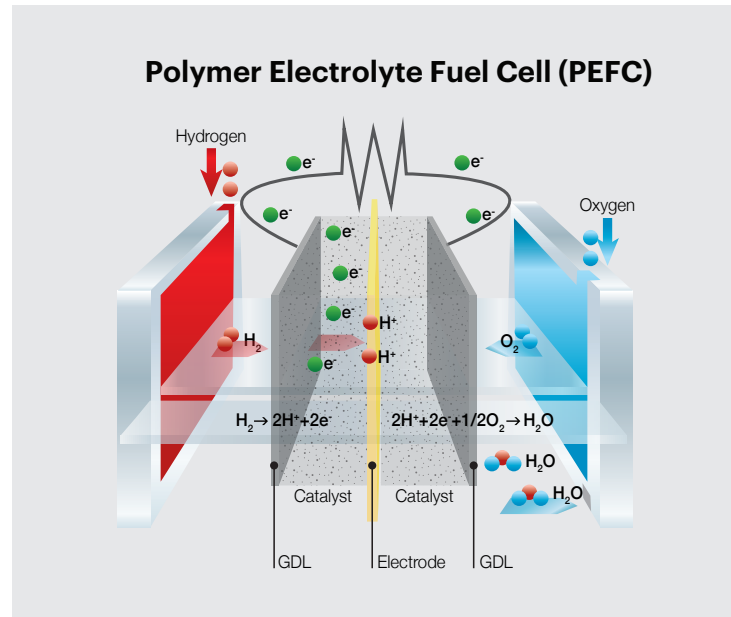
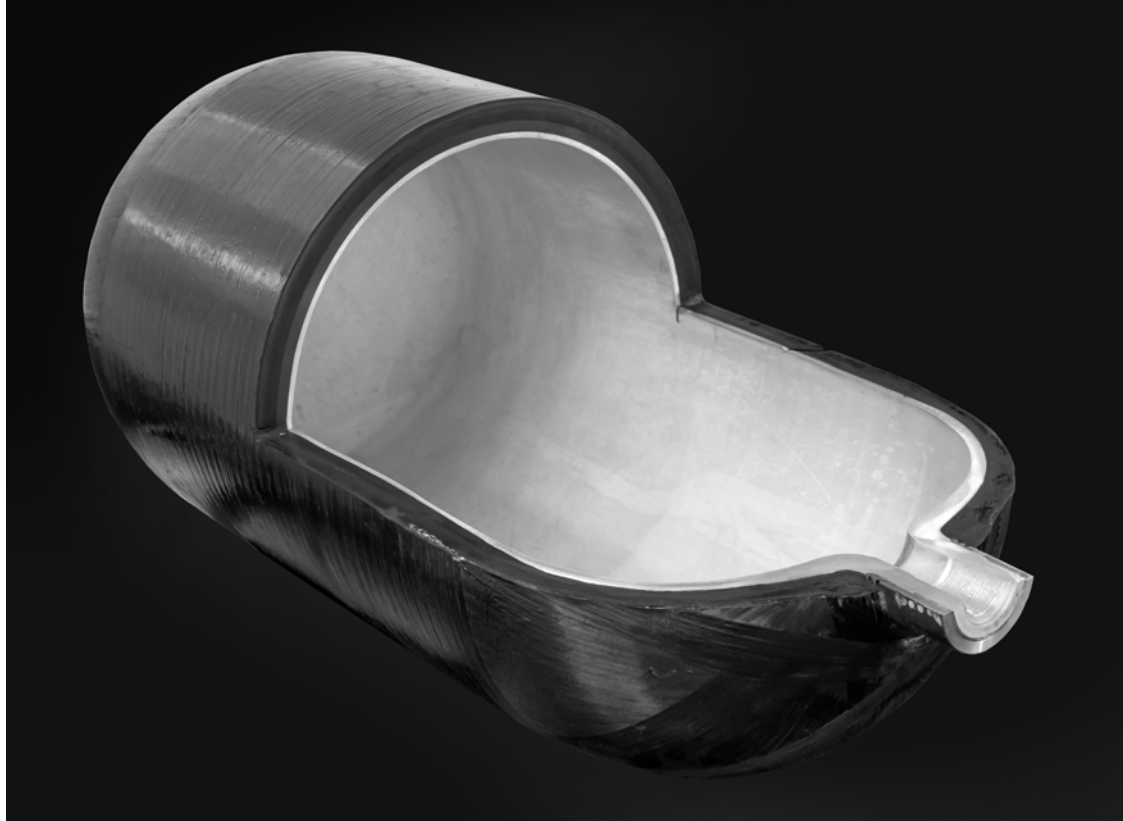
ADTEX | Adhesive polymer

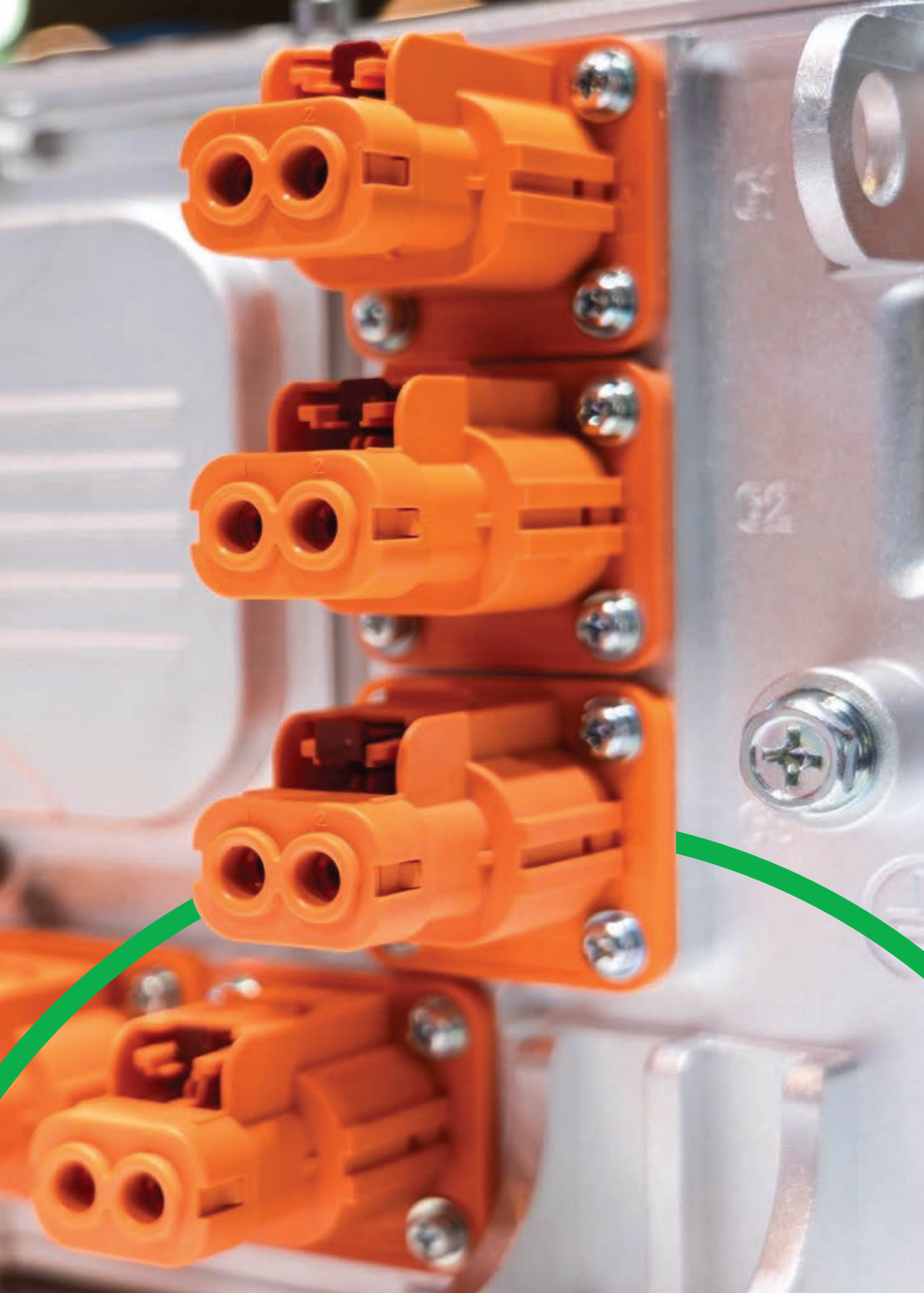
SoarnoL EVOH | Gas barrier

Pyrofil Carbon Fiber Paper | Gas diffusion layer

GMT eFR | Pressure vessel carrier

Pyrofil | High tensile strength carbon fiber & Towpreg for pressure vessels





Electrical

Mitsubishi Chemical Group provides high-performance resins for electrical components to enable flexible, reliable, and safe systems. Within automotive applications, our additives can significantly increase the material durability and toughness, increase processability, and bolster other properties, such as matting effects.

METABLEN | Additive for wire harnesses

NOVADURAN | Cables, connectors

Olefista FR Olefin | High-voltage wiring & connectors

TEFABLOC TPE | High-voltage wiring jackets

Gelest Silicone Solutions | Protective encapsulants,
protective gels, coatings

