

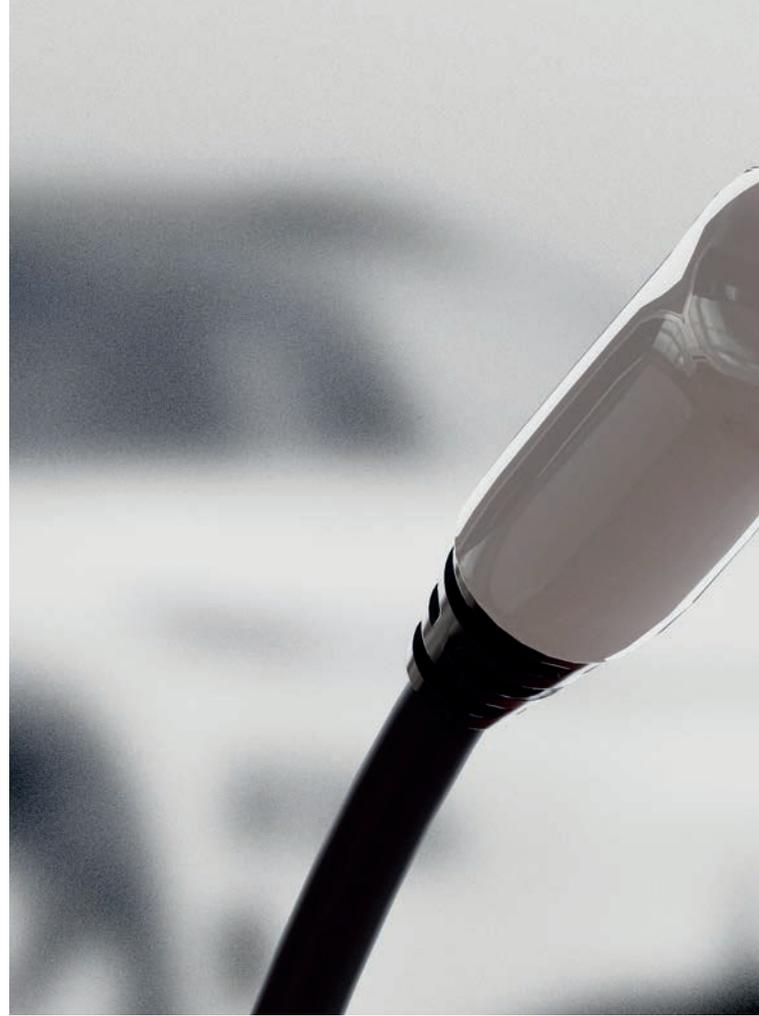
# Powering Electric and Hydrogen Vehicles

Global Solution Provider



Speciality materials  
supporting our green  
transformation

# 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 highly 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 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

## Electric Vehicles

Product	Description	Key Features
<b>ADTEX™</b>	Adhesive Polymer	High adhesive, durable
<b>Hostaphan™</b>	Opaque Film	Strong lap seal ensuring package formation and integrity
<b>CF-FMC</b>	Carbon Fiber Forged Molding Compound	Lightweight CF-reinforced composite with strength and ease of molding
<b>Prepreg</b>	Prepreg for compression molding	Short cycle times, easy processing, variety of reinforcement fibers and resins available
<b>Dianal LP™</b>	Acrylic plastisol	
<b>Gelest™ PP2-TC01/2</b>	Thermally Conductive Adhesive	High thermal conductivity and elongation
<b>Gelest™ XG-3562, XG-3563, XG-3564</b>	Dielectric Gels	Low viscosity, platinum addition cure
<b>GMT™ eFR</b>		Design flexibility with integrated parts
<b>Hostaphan™</b>	Casting Liner	Lightweight, High strength, High stiffness
<b>KyronMAX™</b>	Structural Thermoplastic Composites	World's strongest injection moldable thermoplastic
<b>KyronTEX™</b>	Structural Thermoplastic Composite Sheets	Lightweight, High strength, High stiffness
<b>MAFTEC™</b>	Alumina Fiber	Excellent thermal management and fire retardant
<b>MODIC™</b>	Adhesive Polymer	Battery cooling lines and tubes
<b>Novaduran™</b>	PBT Resin	Excellent mechanical properties, rigidity, heat aging resistance and chemical resistance
<b>Olefista™</b>	Halogen-Free FR Olefin	High-voltage wiring and connectors
<b>Pyrofil™</b>	Carbon Fiber	Lightweight, excellent strength and stiffness
<b>Qtex™</b>	Organo Sheet	Lightweight, High strength, High stiffness
<b>rCF</b>	Recycled Carbon Fiber	Lightweight, excellent strength and stiffness
<b>SF-MPG</b>	Anode Material	High output performance, smooth ion release
<b>SoarnoL™</b>	High Gas Barrier Resin	Excellent barrier properties
<b>Sol-Rite™</b>	Formulated Electrolytes	High power density & output
<b>SymaLITE™</b>	Low Weight Reinforced Thermoplastics	Durable, noise-insulating material
<b>TEFABLOC™</b>	Thermoplastic Elastomer (TPE)	Soft, flexible and multi-material compatibility
<b>Thermal Spacer</b>	Thermally responsive insulator/conductor	High heat conductor, unique phase-change behavior



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## Lithium-Ion Battery Cell & Module Materials

**Sol-Rite™** | Formulated Electrolytes

**SF-MPG** | Anode Materials

## Thermal Management & Fire Protection

**MAFTEC** | Fire shield

**HOSTAPHAN™** | Material encapsulation

**MODIC™** | Battery cooling lines & tubes

**ADTEX™** | Battery cooling lines & tubes

**Mitsubishi Thermal spacers** | Thermally responsive insulator/conductor

**Gelest** | Gap fillers

**Gelest** | Adhesives

## Battery Pack Structural Materials

**CF FMC** | Structural components

**KyronMAX** | Structural components, latches, brackets

**GMTex** | Structural components

**KryonTEX** | Structural components

**Prepreg** | Structural components

**RecycledCF** | Structural components

**GMT eFR** | Structural components, capacitors

## Connectors & Electrical Components

**NOVADURAN** | Connectors

**Olefista** | High voltage wiring & connectors

**TEFABLOC** | Wiring & Wire harness

**Gelest Silicone Solutions** | Protective encapsulates, protective gels, coatings

## HV Pressure Vessels & Fuel-cells

**ADTEX** | Adhesive polymer

**SoarnoL EVOH** | Gas barrier

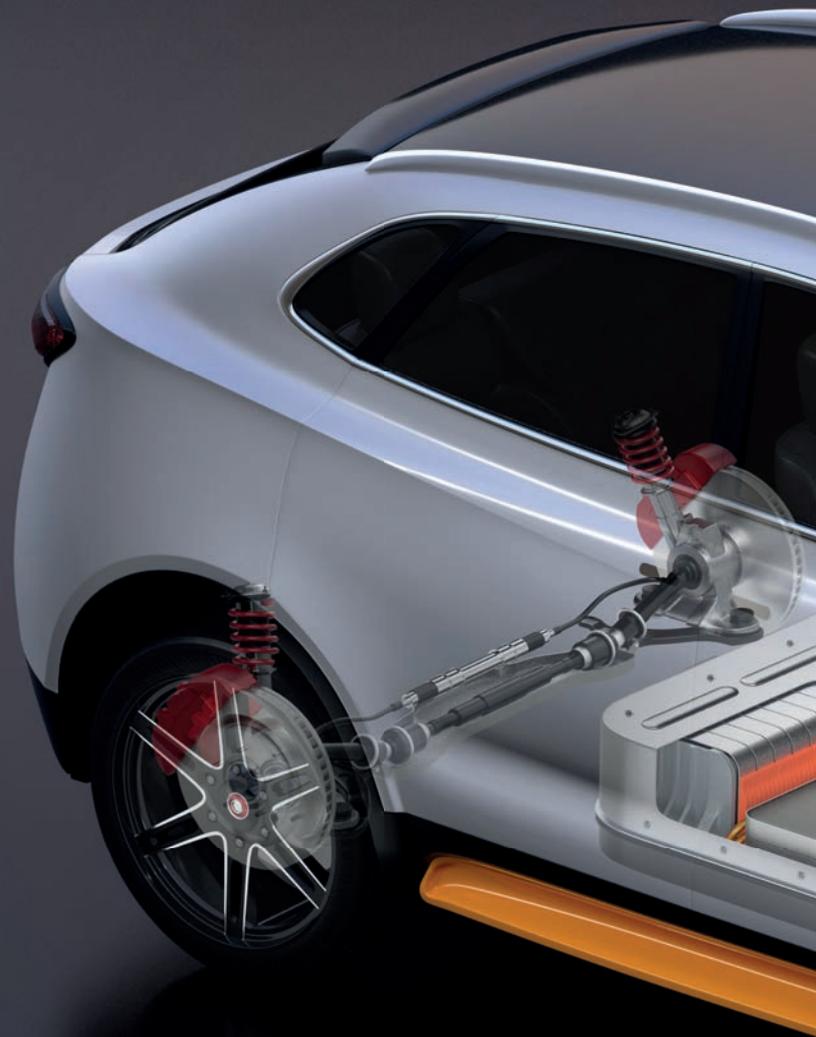
**PYROFIL™** | CFP/GDL Gas Diffusion Layer

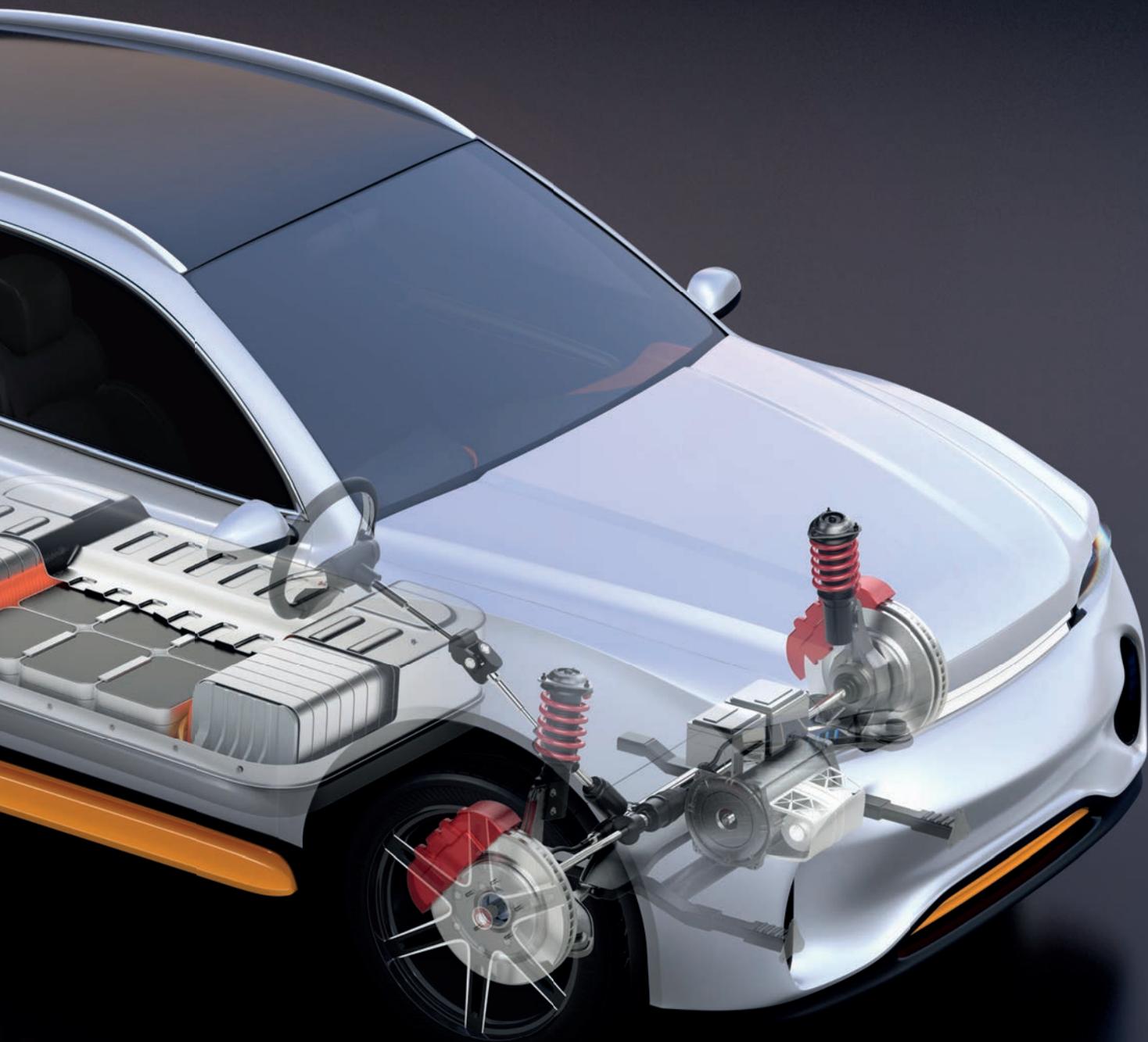
**GMT eFR** | Pressure vessel carrier

## Electric Motors

**CF FMC** | Structural components

**KyronMAX™** | Structural components





# 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 Integrated 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.

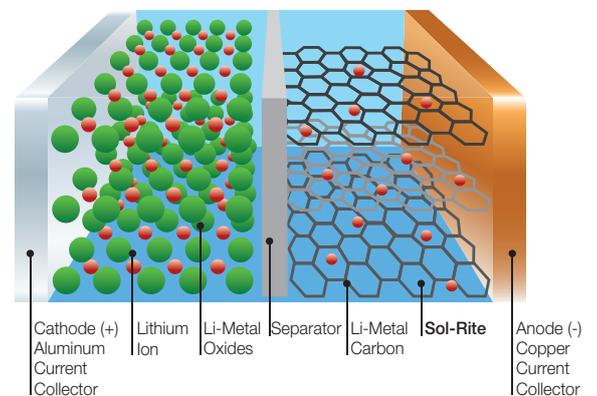


## Technology Highlight

### 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.

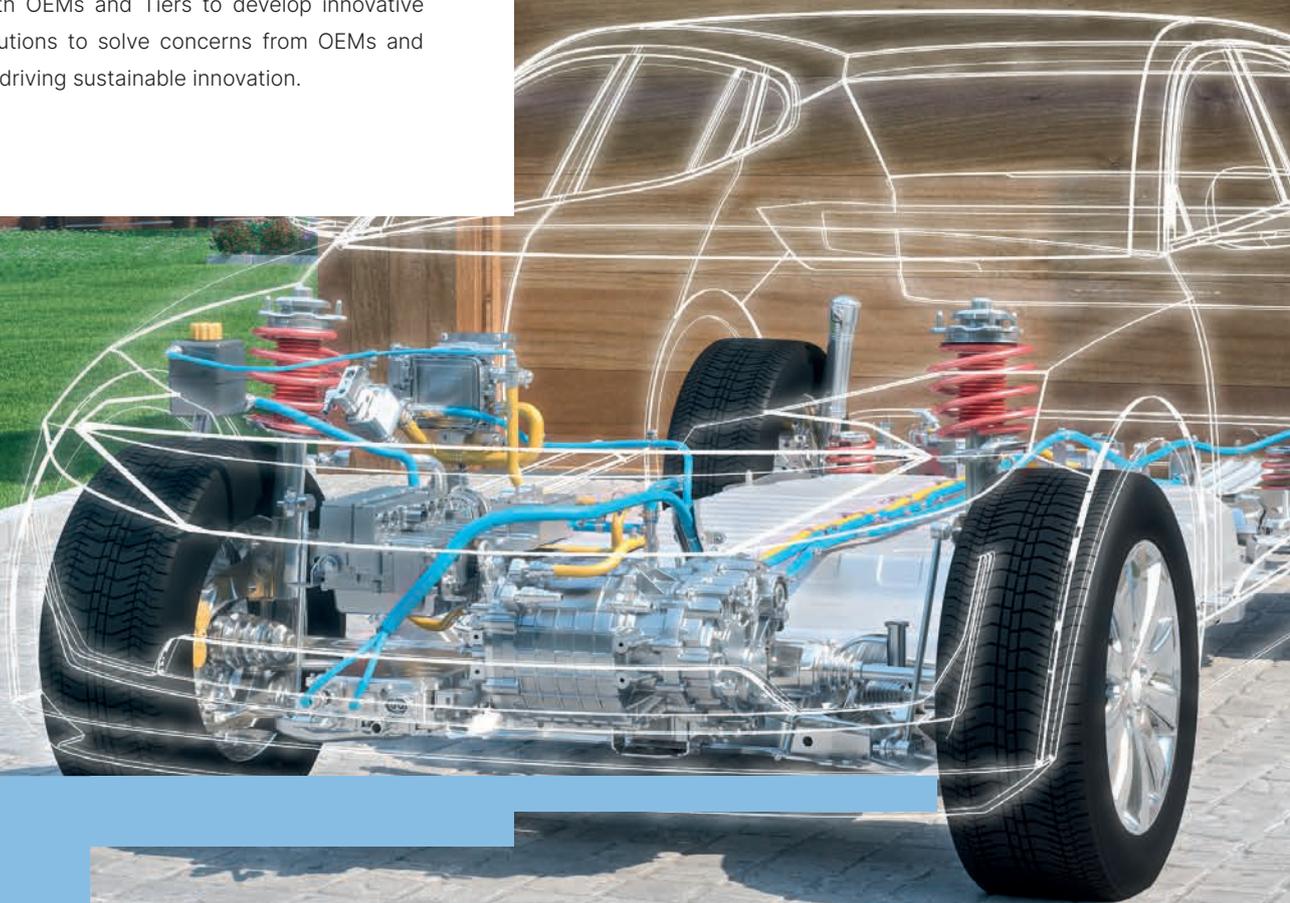




## Electric Vehicle Challenges

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

**Sol-Rite** | Formulated electrolytes

**SF-MPG** | Anode materials

**Hostaphan™ 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 various solutions for controlling heat flow, fire protection, battery cooling lines and tubes, and a foam casting liner. We also offer 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

**Mitsubishi 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

**rCF** | Structural components

**GMT eFR** | Structural components



## 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.

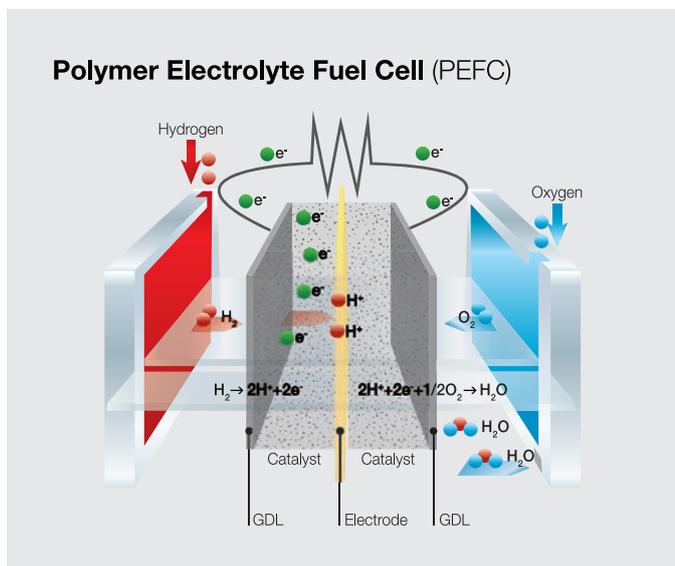
**ADTEX** | Adhesive polymer

**SoarnoL EVOH** | Gas barrier

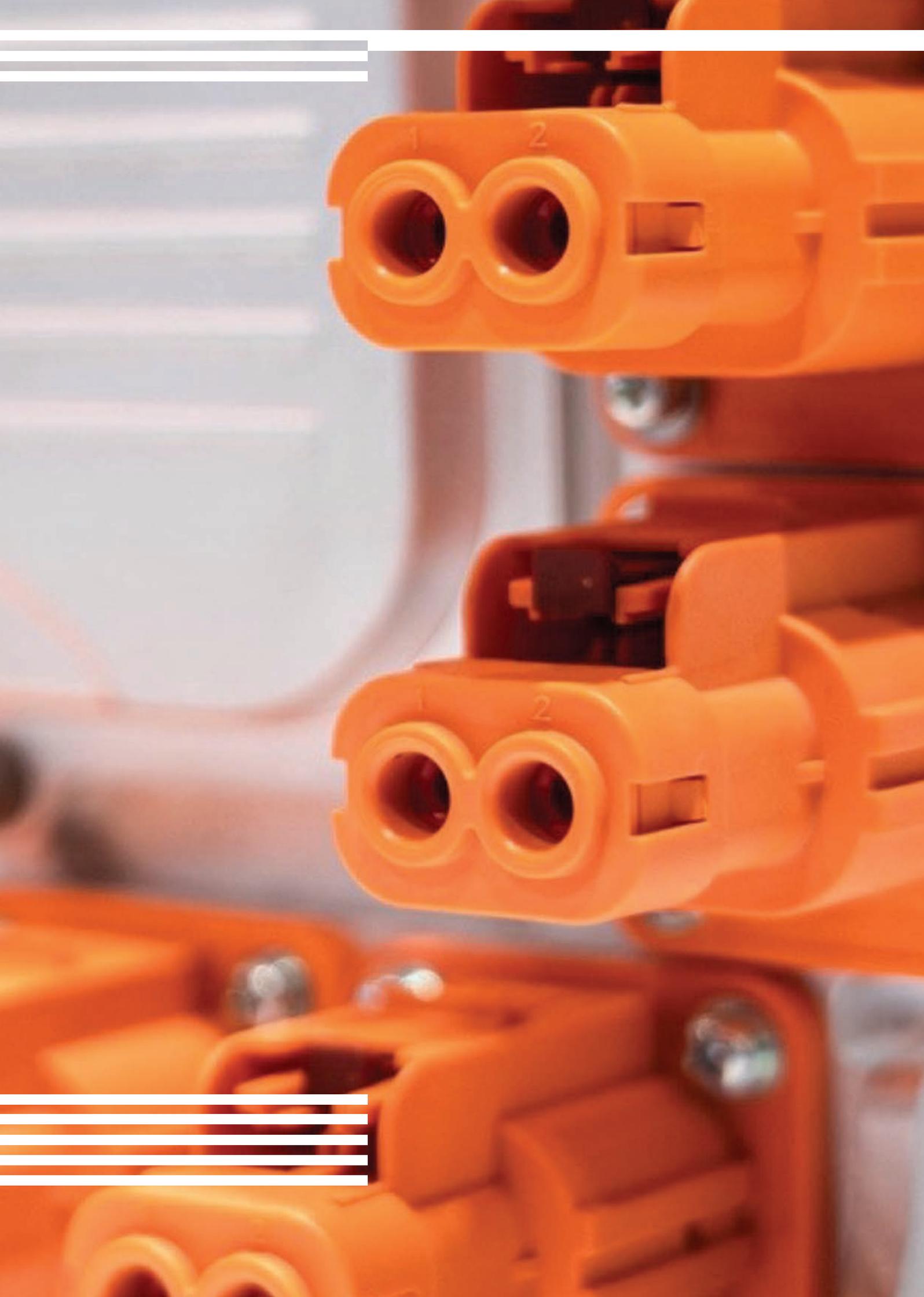
**Pyrofil Carbon Fiber Paper** | Gas Diffusion Layer

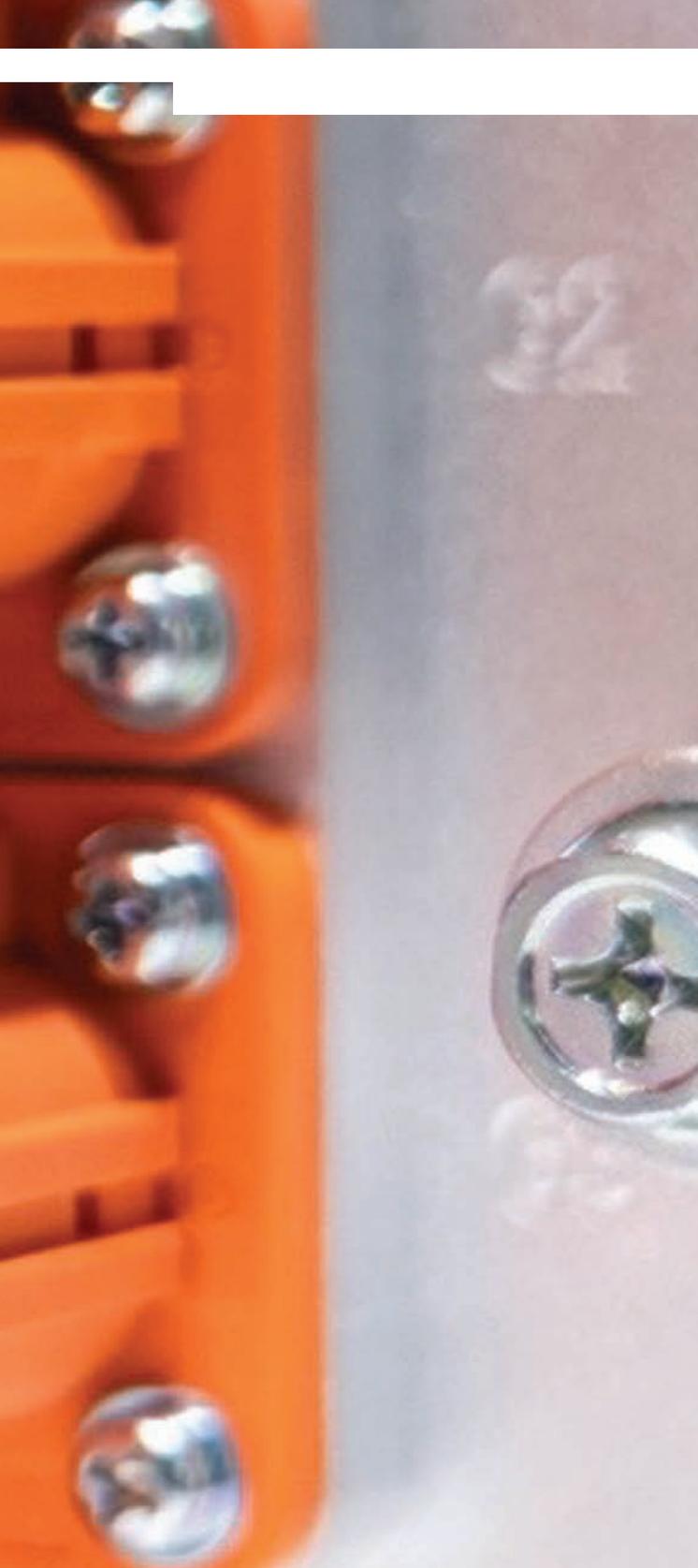
**GMT eFR** | Pressure vessel carrier

**Pyrofil** | High tensile strength CF & Towpreg for pressure vessels









## EV Electric Motors

Mitsubishi Chemical Group has partnered with customers to develop high-quality materials for the EV space, including solutions specific to rotors and housings of electric motors.

Our molding compounds and thermoplastic composites produce high-strength, lightweight structural components made to stand the test of time.

**CF FMC** | Structural components

**KyronMAX** | Structural components

## 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.

**METABLEN** | Wire harnesses

**NOVADURAN** | Connectors

**Olefista FR Olefin** | High voltage wiring & connectors

**TEFABLOC TPE** | High-voltage wiring jackets

**Gelest Silicone Solutions** | Protective encapsulants,  
protective gels, coatings



# Supporting the world of Electric and Hydrogen Vehicles



[www.eu.mitsubishi-chemical.com](http://www.eu.mitsubishi-chemical.com)

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