

Dura-BMC in energy storage

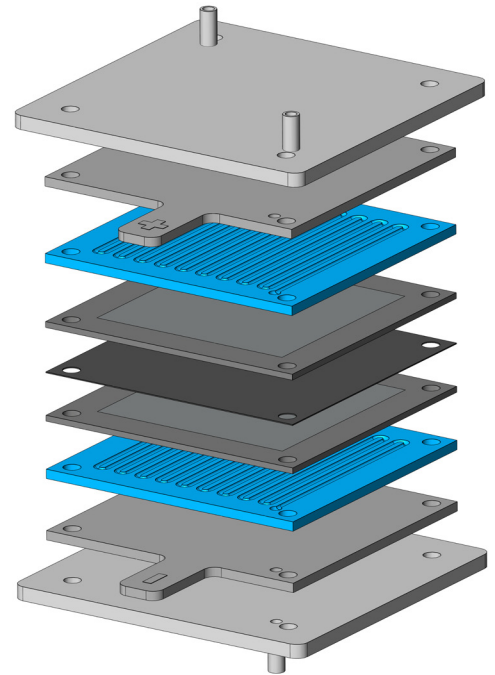
Conductive Bulk Molding Compounds (BMC)
for fuel cell and battery applications



Product information

A bipolar plate is a multi-functional component within a cell stack and is an important element in fuel cell, flow battery and electrolyzer technologies.

Bipolar plates uniformly distribute gas and air, conduct electrical current from cell to cell, remove heat from the active area, and prevent leakage of gases and coolant, all while providing mechanical support to the Membrane Electrode Assembly (MEA).



Bipolar plate material considerations

- Corrosion: electro-chemical stability to meet lifetime requirements
- Power Density: minimize thickness while maximizing surface area
- Weight: minimize stack weight (including fluids)
- Application Durability: inertness to other stack components
- Heat Resistance: strength to operate at >100C°

Bipolar Plate Material Comparison

Conductive *Dura-BMC* outperforms competitive materials in key areas while achieving other desired property needs.

✓ Best ✓ Good ✗ Poor

| Property | Resin Infused Graphite | Conductive <i>Dura-BMC</i> ★ | Metallics |
|-------------------------|------------------------|------------------------------|-----------|
| Corrosion Resistance | ✓ | ✓ | ✗ |
| Electrical Conductivity | ✓ | ✓ | ✓ |
| Mechanical Strength | ✓ | ✓ | ✓ |
| Mechanical Flexibility | ✓ | ✓ | ✓ |
| Thermal Conductivity | ✓ | ✓ | ✓ |
| Temperature Stability | ✓ | ✓ | ✓ |
| Formability | ✗ | ✓ | ✓ |
| Gas Permeability | ✓ | ✓ | ✓ |
| Specific Gravity | ✓ | ✓ | ✗ |
| Mass Production | ✓ | ✓ | ✓ |
| Material Cost | ✗ | ✓ | ✓ |

Actual properties and cost are determined by the cell design, specific composition and manufacturing process for each material.

Advantages of Conductive *Dura-BMC*

- Moldable net shape with <1-minute cycles
- Easily machined during development of channel geometry
- Design flexibility - independent flow channel geometry on each side
- Lower plate / bipolar assembly cost
- Excellent corrosion resistance; enabling durability for longer life
- Capable of 1.5 mm thick bonded two plate assemblies with cooling channels
- Proven success in stationary fuel cells, flow batteries and electrolyzers

Conductive *Dura-BMC* Property Overview

As part of the LyondellBasell *Dura-BMC* portfolio, these conductive solutions are formulated for the unique needs in bipolar plate applications.

| Property | Units | <i>Dura-BMC</i> 940-15252A | <i>Dura-BMC</i> 940-13905 | <i>Dura-BMC</i> 940-21769 |
|--|-------------------|---|---|---|
| Density | g/cm ³ | 1.79 – 1.82 | 1.80 – 1.84 | 1.87 – 1.90 |
| Flexural Strength | MPa | 56 | 40 | 29 |
| Compressive Strength | MPa | 65 | 75 | 35 |
| Glass Transition T _g | °C | 196 | 200 | 185 |
| Electrical Conductivity Through Plane | s/cm | 25 | 50 | 25-28 |
| Electrical Conductivity In Plane | s/cm | 133 | 100 | 72 |
| Product Description | | Ideal when maximum power and a minimum stack weight and volume is required Improved material flow and mold fill performance, achieving a thin molding (<1mm thick) | For use in electro-chemical devices capable of generating electricity from oxygen and hydrogen Addresses high conductivity demands, reaching 50 s/cm through plane | Suitable for applications in a highly corrosive environment High chemical resistance to dilute acids |
| Applications | | Transportation | Stationary fuel cells and flow batteries | Stationary fuel cells and flow batteries |

About us

We are LyondellBasell (LYB) – a leader in the global chemical industry creating solutions for everyday sustainable living. Through advanced technology and focused investments, we are enabling a circular and low carbon economy. Across all we do, we aim to unlock value for our customers, investors and society. As one of the world's largest producers of polymers and a leader in polyolefin technologies, we develop, manufacture and market high-quality and innovative products for applications ranging from sustainable transportation and food safety to clean water and quality healthcare. For more information, please visit www.lyb.com or follow [@LyondellBasell](https://www.linkedin.com/company/lyondellbasell) on LinkedIn.

Before using a product sold by a company of the LyondellBasell family of companies ("LyondellBasell"), users should make their own independent determination that the product is suitable for the intended use and can be used safely and legally. LyondellBasell MAKES NO WARRANTY, EXPRESS OR IMPLIED (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE) OTHER THAN AS AGREED TO BY LyondellBasell IN THE PRODUCT SALE CONTRACT.

LyondellBasell prohibits or restricts the use of its products in certain applications. For further information on restrictions or prohibitions of use, please contact a LyondellBasell representative.

Users should review the applicable Safety Data Sheet before handling the product.

Dura-BMC is a trademark owned or used by one of the LyondellBasell family of companies and is registered in the U.S. Patent and Trademark Office.

