ROCO NEWSLETTER

WHAT'S NEW?

We are excited to announce that RoCo® has finalized the sale of it's intellectual property for Direct Air Capture to [Carbon Blade](#)! The revolutionary DAC technology allows solvent regeneration without heat, which fosters the creation of smaller, renewable energy-powered modules. This represents a significant stride forward in carbon dioxide removal (CDR). "The sale of its intellectual property demonstrates RoCo's® continued dedication to promoting innovative solutions that reduce the cost of carbon capture and contribute to environmental conservation," said Batool Nulwala, CEO of RoCo®. The complete press release can be found [here](#) if you want to learn more.

CARBON BLADE

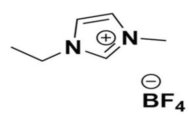
PRODUCT CATALOG

Our product catalog on the [RoCo](#) website continues to grow, with over 250 products now available for purchase. We are uploading new products weekly, so if there is a product you are looking for and don't see, please [email us](#) and we will be happy to help!

ILs FOR METAL BATTERIES

The following products are some of the most commonly used ionic liquids in lithium-ion, lithium-metal and sodium-ion batteries due to their favorable physicochemical properties. To learn more, see our blog on page 2!

[RoCo | 1-Ethyl-3-methylimidazolium tetrafluoroborate](#)



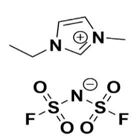
PRODUCT CODE: IL-0006-HP

CAS NO: 143314-16-3

CHEMICAL FORMULA: C6H11BF4N2

SYNONYMS: EMIM BF4, EMIMBF4

[RoCo | 1-Ethyl-3-methylimidazolium bis(fluorosulfonyl)imide](#)



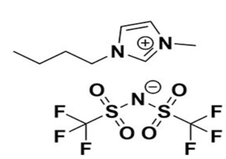
PRODUCT CODE: IL-0342-HP

CAS NO: 235789-75-0

CHEMICAL FORMULA: C6H11F2N3O4S2

SYNONYMS: EMIM FSI, EMIMFSI, EMI FS

[RoCo | 1-Butyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide HP](#)



PRODUCT CODE: IL-0029-HP

CAS NO: 174899-83-3

CHEMICAL FORMULA: C10H15F6N3O4S2

SYNONYMS: BMIM TFSI, BMIM FSI

Environmentally Conscious Energy Storage Devices

There are currently more than 16 billion mobile devices worldwide, which is expected to increase to 50 billion by 2030. As connectivity, electric vehicle usage, and renewable energy integration continue to rise, so will the demand for energy storage. Lithium-ion batteries (LIBs) are the preferred option for portable energy due to their high efficiency. LIBs have significantly improved our lives by powering new devices and making widespread adoption of smartphones possible. Over the past 25 years, LIB technology has focused on improving its specific energy (Wh kg−1) and energy density (Wh L−1), resulting in better performance. The use of LIBs in the automotive industry is now the fastest-growing area.

Figure 1: Future Battery Performance Parameters

It is crucial that we move away from using fossil fuels to generate energy. However, it is equally important to be mindful of the environmental hazards associated with battery technologies, particularly Lithium-ion batteries (LIBs). Although the public perceives LIBs to be eco-friendly, the fact is that long-term LIBs have risks. While 99.5% of lead-acid batteries are recycled, there is no effective recycling process for LIBs used in consumer electronics due to the varying combinations and quantities of chemicals they contain. We must develop new technologies that do not have dire environmental consequences.

Batteries are commonly made up of metals such as cadmium, nickel, cobalt, copper, iron, and lithium. The newer generation of battery electrolytes also contains fluorinated electrolytes, which can be toxic if not disposed of properly. When batteries are thrown into household trash, they end up in landfills, where they can seep harmful chemicals into the soil and our water and food supply. Moreover, if batteries are burned, they release highly toxic and hazardous compounds. It is essential to dispose of batteries appropriately to prevent harm to the environment and human health.

Depending on the application, the type of battery used varies as power tools and portable electronics have different energy output and performance needs. Battery manufacturers are aware of the energy needs of the specific device.

However, as the number of battery power devices grows, it is now clear that we need to think about additional key parameters. These include 1) the CO2 footprint of the battery itself in its production and use. 2) Reducing the use of metals such as Cd, Li, Co, or Ni 3) Using more sustainable or "green" materials such as sodium potassium 4) The design of batteries needs to be such that they are 100% recyclable (lead-acid batteries are almost 99% recycled) 5) additional incentives such as tax credits towards green batteries.

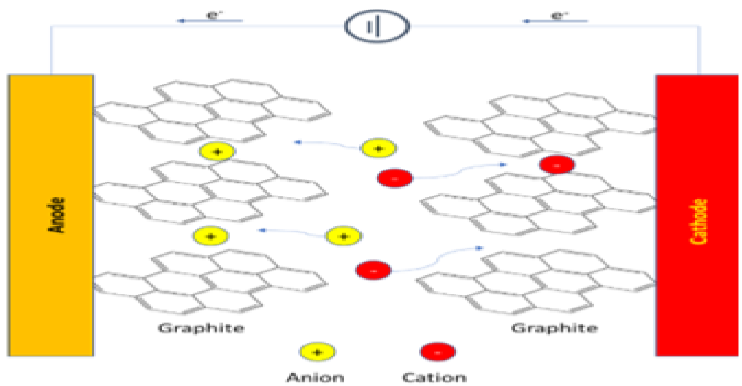
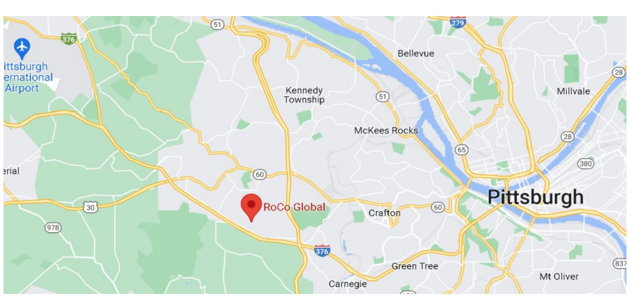


Figure 2: Schematic illustration of the dual-graphite battery (DGB) system During the charge process, ionic liquids are used as the electrolyte.

There are emerging technologies that utilize much lower toxicity and more abundant materials. Specifically, dual-ion batteries (DIBs) are safer and much easier on the environment than mining cobalt and lithium. DIB uses positive and negatively charged ions active in energy storage, as shown in Figure 2.

DIBs promise to deliver high energy density at a low cost using safe materials. However, their performance has been hindered by issues related to stability and electrolyte performance at higher voltages. Despite this, DIBs can be charged and discharged at significantly larger currents, making them well-suited for high-power applications, such as propelling heavy objects at high speeds.

Ionic liquids can potentially address the high voltage issues associated with DIBs. They can also be a useful component in metal-free devices. Ionic liquids are particularly suited as electrolytes with high working voltages due to the high working voltage of DIBs. A study done by Wang et al. explored a new dual-graphite battery system that uses pure 1-Butyl-1-methylpyrrolidinium bis(trifluoromethylsulfonyl)imide ionic liquid. The DIB they developed is free of metallic elements and was thoroughly investigated. This opens new possibilities for developing batteries without metals and offers easy recycling methods.



For More Information

Website: https://roco.global

Phone: 724-315-9170