

**MATERIAL MATCHING**

**TRADE-OFFS AND THE SUPPLY CHAIN**

Evaluate information provided about the materials' properties to match each material with its corresponding component of the lithium-ion cell's structure and function.

**SEPARATOR**

The separator is a thin, porous membrane. It separates the anode and cathode. It enables and blocks the exchange of electrically charged ions from one side to the other. If the separator is damaged, that can cause an internal short circuit, and eventually thermal runaway.

**ELECTROLYTE**

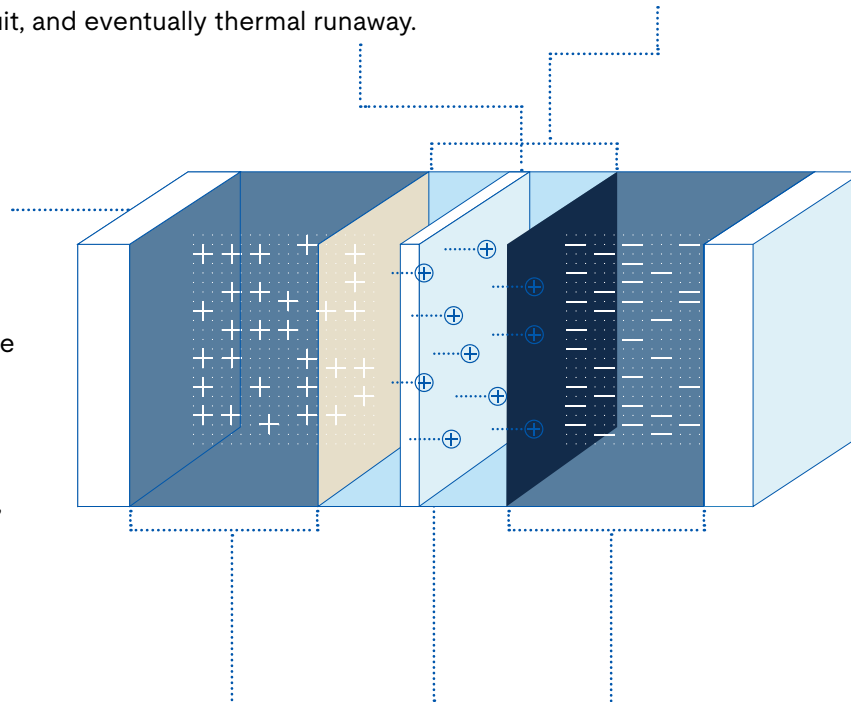
A liquid or gel that conducts electricity. The electrolyte carries positively charged ions from the anode to the cathode and vice versa through the separator. The movement of these ions creates a charge.

**CURRENT COLLECTOR**

A conductive foil at each electrode of the battery. The current collectors transmit an electric current between the battery, the device, and the energy source that powers the battery.

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**ANODE**

The porous anode (negative electrode) serves as the location where lithium ions migrate to and from when the battery cell discharges and charges.

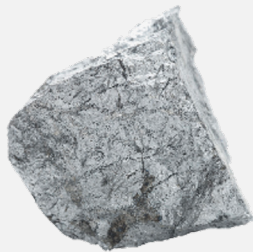
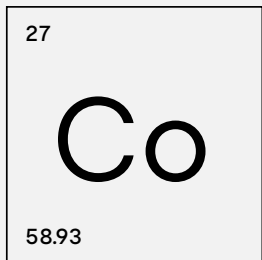
**MOVING IONS**

Ions move between the battery's cathode and anode internally, and electrons move in the opposite direction in the external circuit. This migration is the reason the battery powers the device because it creates the electrical current.

**CATHODE**

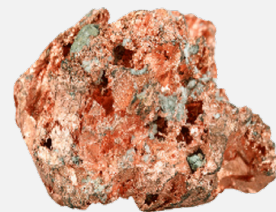
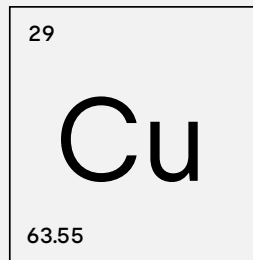
An active material at the cathode (positive electrode) receives lithium when the battery charges and releases it when the battery discharges.

## COBALT



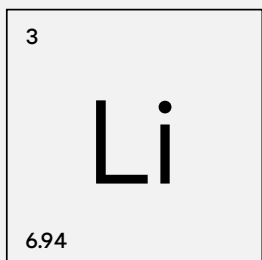
Cobalt is a transition metal. It is solid at standard temperature and pressure. It is often added to alloys to improve their strength at high temperatures.

## COPPER



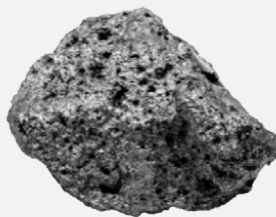
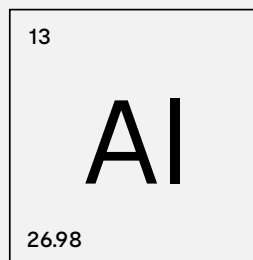
Refined copper is very ductile (easily shaped into a thin foil, wire, or thread). It is highly conductive thermally and electrically.

## LITHIUM



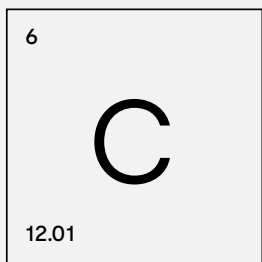
Lithium is the lightest solid element in the periodic table. It is often used to create alloys.

## ALUMINUM



Aluminum is very ductile (easily shaped into a thin foil, wire, or thread). It is highly conductive thermally and electrically.

## GRAPHITE (from Carbon)



Graphite is porous. It consists of layered sheets of carbon atoms.

## PLASTIC

## ORGANIC CARBONATES AND A SALT